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AN ACCOUNT OF THE ETHNIC ORIGIN, PRIMITIVE ESTATE, EARLY MIGRATIONS, SOCIAL EVOLUTION, AND PRESENT CONDITIONS AND PROMISE OF THE PRINCIPAL FAMILIES OF MEN

TOGETHER WITH A PRELIMINARY INQUIRY ON THE TIME, PLACE AND MANNER OF THE BEGINNING

COMPLETE IN EIGHT VOLUMES

By JOHN CLARK RIDPATH, LL. D.
AUTHOR OF A "CYCLOPÆDIA OF UNIVERSAL HISTORY," ETC.

PROFUSELY ILLUSTRATED WITH COLORED PLATES, RACE MAPS AND CHARTS, TYPE PICTURES, SKETCHES, AND DIAGRAMS

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To My Wife

Worthy of a Nobler Tribute

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General Preface.

THE motives, as well as the materials, of a literary work are derived from many sources. The reasons which the mind of the writer may give to itself for its activity and persistence in a certain labor are complex in the extreme, and often difficult to discover. The real origin of a book is lost in the obscurity of the unconscious or half-conscious provinces of the intellect and the will. Now that the present work has been completed and is ready for delivery to the public, I search for its genesis with the hope of making the reasons of its existence clear, and with the desire to furnish a measure of justification for the enterprise.

Through a period of more than a quadrennium I have been steadily engaged with the composition of these volumes, the plan of which suggested itself to my mind, though dimly, fully a score of years before it began to be executed. In youth, and while engaged in giving historical instruction in an institution of the higher learning, I discovered in myself a deep and lasting interest in all matters relating to the origin and development of the different races of mankind. The disposition to learn as much as possible about ethnic facts asserted and reässerted itself in the greater part of my studies. Like other inherent traits, this continued to clamor for recognition and exercise until it finally obtained the command of the faculties in a campaign of special study, the results of which are declared in the following pages.

It is possible that the enterprise which has culminated in the composition of these volumes would never have been undertaken had it not been for the preparation by the author of another work intimately connected in its subject-matter with the present treatise. That other work was a *Cyclopædia of Universal History*, published in 1885. The theme was such as to suggest, and at length demand, another, which is here developed as the complement of the first. All historical composition is calculated to bring to the attention of the writer subjects and trains of thought which he would doubtless have overlooked in other fields of inquiry. My own experience in this particular may possess a general, as well as a personal, interest.

While engaged in the preparation of the work referred to, I was led to reflect much and attentively upon the true nature of history and historical composition. That which had existed obscurely in the understanding hitherto became at length more distinct, and I began to discern certain features of the subject which, if I mistake not, have escaped general observation. The principal of these was a clear recognition of what I will call *the objective nature* of the great fact which goes by the name of History. More and more I came to see that history, as it has been understood and written by men, is in the nature of a *product* or *result* of human activities. If we open the pages of any standard historical work and begin to follow the

narrative, we shall find it to be an account of the objectivities resulting from the action of the wills and purposes of men. It will be found to be a delineation of the *things done by mankind*, of the achievements of the human race, of the institutions founded, the resources gathered, the campaigns made, the cities builded, the governments created, the methods employed, and indeed all the visible *results and products* of the agency and purposes of men in their associated life. The more the inquirer studies formal history the more he will discover its resultant and objective character.

The fact that general history is of the character here described entered strongly into my convictions. I came to perceive that the work in which I was engaged was of the kind outlined above. It dealt, as it were, with the *residue* of man's activities on the earth. It considered results. It delineated events. It followed the evolution of institutions and described the tangibilities of human action and achievement. Ever and anon, however, the inquiry arose as to the *agency* by which all this was effected. The question of the peoples and races by whose genius and spirit all the visible facts of human history are produced haunted the inquiry more and more, to the extent even of disturbing my studies and confusing my materials.

At first the suggestion of the importance of the *actors* in the human drama, as distinguished from the *acts*, came dimly and obscurely to view. Afterwards it became distinct, persistent, and imperative. I found myself stationed between the objective phenomena and the subjective agencies of human story. Glancing in one direction, I might see the vast panorama of events, the architectural remains, the monuments of passing ages, the relics of human activity, the institutional forms of society, the governments and nationalities that have paraded with so much pomp on our vast stage of action, and in the other direction I saw the races of mankind themselves. The difference between the one class of facts and the other grew as distinct as that which discriminates a statue from the sculptor, a written scroll from its writer, a city from its builders.

Already before reaching a clear notion of this double view of human history I had unconsciously, or half-consciously, adopted the method of incorporating with such historical narrative as I had produced certain ethnic features. It had seemed to me of importance that references be made to the race character and affinities of the various peoples, to their resources, environing conditions, and manner of life, as well as to the results and products of their activity. I was still following this plan of composition when the *Cyclopædia of Universal History* was prepared.

Whoever has given attention to the method of that work may discover in the same the evidences of that double view of the subject to which I have just referred. Especially in those parts relating to the great nations of antiquity did the author depart, by a considerable stage, from the prevailing manner of history, and incorporate a measure of ethnic materials with the general theme. With the progress of the work and the expansion of the subject such materials were crowded out; but the conviction settled on the writer's mind that the whole story of man-life should be written anew from the standpoint of ethnography, and that if this were faithfully done the result might surpass in interest and value any possible account of those objective facts and phenomena which have gone by the name of history.

Out of this the suggestion arose with me and became fixed as a purpose to turn squarely about in the inquiry and take another view of the history of mankind; that is, a view of *the human race itself*. It seemed to suffice that that kind of narrative which relates to the deeds, institutions, governments, and tangible activities of mankind had fulfilled itself by repetition and multiplicity. Something else seemed to be demanded—something which should deal, not with the temple of humanity, but with the architect; not with the dead facts and residue of the activities of men on the earth, but with the agents by whose genius and purpose all this has been effected; not with nationalities and powers, institutions, achievements, wars and treaties, senates, revolutions, but with that living power whereby all this has been accomplished—with humanity itself.

Out of these conditions and antecedents the present history of the GREAT RACES OF MANKIND has arisen. In the preparation of the work the author has reversed his position in the human landscape. He has ceased to look at the accomplishments of the human race, save as those accomplishments serve to illustrate the character of the producing force, and has turned to the race itself. He has thus aimed to produce *an ethnic history of mankind*, dealing not with the facts and achievements, but with the substance of man-life itself.

It is believed that the more the reader attentively considers the nature of the subject the more clearly will he discern the essential verity of this distinction between ethnic history and the history of facts and events. An apprehension on his part of this difference is necessary to his interest in these volumes and to his understanding of what they contain. The work, as the title implies, is an account of the ethnic origin, the primitive condition, the early migrations, the historical development, and the present state and prospects of the principle families of men, together with a preliminary inquiry on the time, the place, and the manner of the beginning of man-life on the earth. It is in no respect a narrative of the deeds and accomplishments of mankind; for that would be a repetition of the author's previous essays in historical literature; the present work is an account, not of events and institutions, but of the human race itself.

A second motive for the production of such a work may be mentioned. This is the existence in our times of a widespread interest in everything relating to ethnological subjects. There has never been a time in the past when men have been so much concerned to know themselves and the sources from which they have proceeded. This curiosity is a part of the scientific spirit of the age. The mind of man is no longer satisfied with vague, traditional, and imaginary views respecting the race to which he belongs and the manner of its evolution. The profound intellectual unrest which so strongly characterizes the closing years of our century, includes as one of its leading features a curiosity to know as much as possible about the origin, development, and vicissitudes of the various races of mankind. The mind has wearied somewhat with the contemplation of those palpable facts and events which have hitherto constituted the subject-matter of history. It turns in quest of a truer knowledge of the profound and vital phenomena discussed in ethnic history; the human race is substituted as a theme in place of what the race has accomplished.

The existence of this deep interest in

the races of men as a subject of inquiry has not been answered as yet with any adequate literature. Hitherto the topics of ethnology have been handled in a narrow and scholastic way quite remote from public concern. Our books on the races of mankind have been for the most part small and fragmentary treatises embracing the results of particular studies in this field of investigation or in that. More recently the attempt has been made to present the subject from a broader and more comprehensive point of view. In this departure German ethnographers and historians have led the way. A like treatment of the subject has appeared in the literatures of other peoples. We are now at the beginning of a vast and varied scholarship devoted to an exposition of the human family, and of the various parts into which our race has differentiated.

A few words may properly be added respecting the illustrative parts of this treatise. It has been the author's aim and purpose to make the illustrations in all particulars conform to the subject-matter of the work. Special pains have been taken to secure a perfect harmony between the text and the pictorial embellishments. The colored plates and charts have been drawn for the better elucidation of those parts which seem most to require the use of the eye as an auxiliary to the understanding. Ethnic history is especially rich in the suggestions which it offers for illustration. It seems to call loudly for drawings and type-pictures and charts, to the end of a clearer and more vivid apprehension of the subject under consideration. In the work of gathering and preparing much more than two thousand illustrations with which the following pages are adorned the author has had the cordial coöperation and support of the Publishers, to whose liberality and good judgment he is profoundly indebted.

We here heartily join in the intellectual movement peculiar to our age, and contribute our humble part to the explication of one of the greatest themes of modern inquiry. The author, in this day of the deliverance of his work to the public, does not flatter himself that he has greatly enlarged the boundaries of human knowledge, but claims rather to have cleared somewhat the horizon in this part and in that, to have visited in thought and reflection some unfrequented parts of the temple of humanity, and to have aided in his limited sphere to put the house in order for his successors.

It has been my hope and ambition in the present work to cover, however imperfectly, the whole field of the inquiry, and to mark the limits of current knowledge respecting the races of mankind as the same are known to us at the close of our splendid century. How far short of a perfect accomplishment the writer has come, how many and serious are the imperfections of his work, he is painfully aware; but he presumes, as hitherto, upon the good will and favor of the public, to whom he now delivers the results of his latest study in the spirit and with the trust of one who, proud of his age and country, would fain contribute something to the intellectual resources, progress, and happiness of that great and glorious people with whom he is allied in race descent and destiny.

J. C. R.

GREENCASTLE, 1893.

RIDPATH'S

UNIVERSAL HISTORY

VOLUME I.

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General Introduction.

MANKIND is not an event, but a producing force. The history of the human race, therefore, differs essentially from the history of events. The one is the story of man-life as such, and the other an account of the results and products of that life under the dominion of instinct and reason. The first relates to our race as a living entity, and the second to the works which men have accomplished. The one looks constantly to the agent out of whose activities all events have arisen, and the other to the events themselves. The first may be called the subjective, and the other the objective phase of human story. These distinctions are fundamental to an understanding of the inquiry upon which we are here to enter.

Subjective and objective phases of human history.

In considering the subjects proper to Ethnic History, the reader will not have proceeded far before he will discover that they differ *toto cælo* from the themes of general history. The latter begins with the movements and results of organized society. It relates to the circumstances of national life. It takes into consideration the connections of state with state, kingdom with kingdom, power with power, and the phenomena resulting from internal development and foreign contact. It seizes the visible aspects of human affairs, and deals with them as the products of the wills and purposes of peoples. It dwells upon the works of man associated, the consequences of his exertion, the tangibilities of his civil and political life, and in particular the national features of his communities and governments. It is an account of the evolution of institutions, the fruits of those institutions, the manner in which those fruits are gathered and consumed, and the successions and cycles through which all organic forms produced by the desires and ambitions of mankind pass in the course of their fulfillment.

The objective phase depicts the evolution of events.

It is not meant that general history is limited to the consideration of the public life of mankind. The limitation relates to the objectivity of the facts and events which constitute the subject-matter and determine the character of such history. Certain it is that the greater part of the historical writings of the world have been devoted to public affairs. They have dealt with peoples as a whole, with their organized activities, with their forms of government and methods of administration, with aspects and displays of power well calculated to fix the attention and interest of the inquirer. General history has been made to deal with organizations as a fact, with civil and military affairs, with those movements and institutions which, on the one hand, conduce to the power of nations, or, on the other hand, sap and destroy them, and with all the ostensible agencies of peace and war.

General history deals with the objectivities of society.

Recent history, however, has not contented itself with this cycle of discussion. On the contrary, it has descended from the story of affairs to the story of the people, taking into consideration the

manners, customs, social institutions, commerce, and intellectual progress of the various nations. Nevertheless, the narrative has still continued to deal with objectivities, with products, and results. This has been as true of our so-called histories of the people as it is true of the older histories which deal exclusively with public affairs to the neglect of the common lot. The difference between the old and the new narrative has been the difference between a public history—an account of public affairs—and a social and domestic history—an account of the private, domestic, and social affairs and institutions of the given people. The change from the old to the new has not been really a change of method, but only of subject-matter. It has not reversed the point of view, turning the attention of the inquirer from the products of man's agency to the man himself, but has been content with the substitution of a new class of facts for those formerly in vogue with historians.

The new method considers private life, but is still objective.

From all this ethnic history departs as if by a whole horizon. The story of the human race—the true story—has not to do with the *results* of human activity on the earth, but rather with the race itself. The *race*, and not the *event*, is the subject-matter of the inquiry. The attention is fixed not on the products of human will and activity, but on mankind as such.

Ethnic history describes the essentials of race-life.

The river in its course from the highlands to the sea may accomplish wonders. It traverses valleys and shapes them. It tries one course through the hills, and then another. It builds up embankments. It creates a world of sand and pebbles. It distributes its shells and other relics of life in this part and in that. It creates a landscape. It dictates the distribution of forests. It leaves the evidences of its work in every part of its course. The ledge of rocks is worn away, and the alluvium of one region is deposited in another. The river even divides into channels. It eddies into bayous and lakes. It rushes through narrow gorges, fills canals, and springs over water wheels. It bears ships and divides countries in its course. It becomes an artery of commerce. Cities are built here and there in situations determined by its windings; nations gather on its banks.

The river an analogue of general and ethnic history.

The evidences of this river-life, the works which it effects, the traces of its passage, may be said in one sense to constitute a history of the river; but the essential river has not yet been touched. What of the river itself? We speak not of the work which it accomplishes in its passage through the lands, but of the river as an independent entity. How great is it? From what sources has it been gathered? By what alchemy and transformation of sun and wind has it been beaten up from tropical seas, blown away in clouds, and poured down in mist or rain or snow on mountain crest, highland, and hillside of the far interior? What are its other fountains? Deep out of mother earth they come in many and widely separated regions. They burst from under ledges of stone. They pour from dark chasms in the mountains. They bubble as springs of living water from a thousand obscure spots at hill-foot, in limestone crevice, by great tree roots, in the solitary forest, through humble wells digged deep by crawfishes in banks of clay.

From such fountains the river gathers its volume. Its waters are blent into one. It pours along, gathering and increasing. It is an entity. It may well seem

alive. It moves and roars and rushes. Its volume is measurable, but becomes immeasurable with increase. Its color is of this tint. Its water has this quality or that. Its manner is placid, smiling, gentle, or angry, turbulent, stormy. It sleeps or wakes. It rejoices with sunshine or calm, moans with the pressure of shadow and tempest, becomes furious, and springs with madness through narrowing gorges and over horrid precipices. It yields to the rigor of winter, and bursts with the renewal of spring. All this is *the river itself*. All this has respect to the substance and life of the great fact, and not to its results and reäctions.

Aspect of our race in its character and motion.

The analogue of the river is the human race. That, too, is a stream flowing from an invisible fountain. That also has had its sources in the highlands of the past, and that also has gathered and rolled down with increasing volume into the plains of the present. Like the river, the human race possesses a life of its own. It is an entity dividing into many entities. It spreads far and covers the earth with its floods. It leaves on all shores and continents the signs of its presence and activities. It builds up and demolishes. It changes its course according to the exigencies of the physical barriers that are set against its progress. It breaks through and traverses vast regions. It modifies the whole globe, and determines both its material and its immaterial aspects. It becomes the one really important fact on the earth. It is to be considered not so much in the effects and changes which it has produced among its environing conditions as in its own essential life.

There thus arises out of the nature of the things considered a marked difference between ethnic and general history. The one gives an account of the races of mankind in their essential nature, powers, capacities, or, in a word, an account of themselves. The other presents a narrative of the facts and deeds of which men have been the authors; the works which they have accomplished; the institutions which they have created; the visible effects of their stay and activity on the earth; the monuments they have builded; the kingdoms and empires which they have devised; the governments they have formed; the wars they have fought; the treaties they have made; the activities they have exerted in peace.

Essentials of difference in the two kinds of history.

With these and the like facts of human agency ethnic history is only incidentally concerned. The ethnic historian does indeed regard all facts and circumstances of the life of man; but he views them only as illustrations of the nature and purposes of the race. By him the very globe is regarded as the scene of race emergence, division, migration, and development; as the environing continent of our species; the ground of its activities. His attention is fixed on the evolution of mankind, on its characteristics and its methods of life.

The ethnic historian uses events as indices of race-life.

In the following treatise the attempt is made to display the history of mankind considered as a race of intelligent beings, multiplying, dividing, migrating, developing, conquering, and possessing the earth. The race is viewed in itself. It is everywhere considered as a living entity, acting unconsciously under its own laws, and fulfilling a mission of which only the higher members of the species have been able to catch occasional glimpses.—It is the object of this Introduction to set forth with as

In this work mankind is considered as an entity.

much conciseness and brevity as possible the general course of the inquiry, and to lead the mind of the reader up to a comprehension of the plan of the work as a whole.

First topics the time, place, and manner of the beginning.

A History of the Races of Mankind must needs include a number of subordinate topics of the greatest interest to all who are in any measure concerned with the destiny of their species. One of the first of such questions is that which considers the *time*, the *place*, and the *manner* of the beginning of man-life on the earth. Certain it is that men at some time in the past made their appearance on this habitable globe. Certain it is also that at some place, or places, such beginning was made. Equally certain is it that the coming of man was in some manner. It was by method. The beginning was not chaotic, but orderly. The inquiry, therefore, turns first of all to the questions here presented. At what time did the human race begin to be? In what place, or places, did it make its appearance? In what manner, by what agencies, immediate or mediate, was the introduction of such a fact as man-life on the globe effected? These inquiries are fundamental to any rational history of the human family. The attempt is made in the inquiry preliminary to the present work to consider them in their proper place as an introductory study to the whole.

Primitive estate of mankind demands consideration.

After deciding, with such approximations to certainty as we may be able to reach, the time, place, and manner of the beginning, our next inquiry will naturally have respect to the *primitive condition of mankind*. The estate of the human race on the outskirts of that impenetrable darkness and barbarism out of which it arose must be considered in the best lights which tradition and science are able to hold aloft. The primeval condition of the tribes and peoples which we are able to discover on their emergence from unconsciousness and savagery is of itself the subject-matter of one of the most interesting themes in the whole natural history of life. It involves the gathering up of the fragmentary details and the reconstruction—as if in outline—of a condition which had not the instinct and capability of recording itself. The study involves the gathering of materials from almost every department of human knowledge, and a sifting and comparison of the data to the end of obtaining an adequate notion of the estate of our race while it still journeyed dimly and doubtfully through obscure ages, far below the horizon of all authentic annals.

Means of determining the aboriginal state of man.

In the course of such an inquiry, we shall be brought into contact with a condition of the world and with aspects of animate existence which we know only by the aid of retrospective science. We shall discover the first men in a deplorable estate, fighting desperately with the huge monsters of brake and river bank and wilderness, struggling to maintain a merely animal life in dark and houseless forests, along wild seashores, and in dripping caverns. We shall note the rude implements and tackle whereby the barbarian life would better its chances in the hard struggle for existence. Out of these traces of the aboriginal life of man we shall attempt to deduce his conditions and prospects in the first discoverable ages of his career on the earth. It is necessary that such a foundation be laid in order to understand the development of the human family, its progress into the higher life, and its final emergence into civilization and fame.

The next special subject in the logical development of our theme is that of *the migrations and distributions* whereby the human species has been dispersed throughout the habitable globe. It is evident that in some manner and at some time the different divisions of our race have made their way in this direction and that, by movements more or less orderly, into the parts of the world which they occupy as the seats of their localized development. To these movements we give the general name of distribution. The fact so called constitutes one of the principal features of a certain stage in the human evolution As primitive tribes multiply and develop, there comes a time when the passion for migration seizes them. The spirit of removal prevails, and they depart from their native seats. In some instances the removal is phenomenal; that is, it is apparent as a distinct phase of tribal life. In other cases the movement is so slow and gradual as to be undiscoverable except after the lapse of time.

Distribution of the races an important theme.

In either event, however, the migration has the same practical result. It carries tribes and peoples into regions hitherto unoccupied by them. It throws them upon other tribes and peoples who are in the way of their advance, or, possibly, into unoccupied regions of the earth. This gives to the early inhabitants of our globe what may be called a *rolling motion*. Generally the movement seems to be instinctive. In some instances the motive is apparent, as the desire of conquest, war, the possession of better countries, escape from enemies, acquisition of unearned resources and advantages.

General view of the nature of migration.

This migratory motion of tribes and peoples, whereby our globe, at one time an uninhabited sphere, has become populated with intelligent beings, is one of the great facts in ethnic history. As such it will occupy a considerable section of the present work. With the fact of migration general history is not greatly concerned; for that takes note, not of the ultimate forces and processes by which the present order has been established, but rather of the phenomena which humanity displays after it reaches the stage of conscious nationality. To ethnic history, however, the migratory movements of the human race are of great and fundamental importance.

Another essential topic in ethnic history is that which considers the *classification* of the races and their arrangement into a whole according to manifest and established principles. It is clear that all men, all varieties of men in all parts of the world and in all ages, have had some scientific relation as the dispersed parts of a common fact. That the human race is coherent to its utmost extreme is evident. A belief in such wholeness and consistency is demanded by the established uniformity of nature and by all that we know respecting the other orders of being and the general scheme of the world.

Classification of races essential; criteria for classifying.

We shall find in this part of the inquiry that at the present stage of our knowledge some uncertainty still exists relative to the best principle of division for classifying the different races of mankind. Some authors have proposed to classify and arrange the parts of the human family by one criterion, and others by another. Nearly all of the physical and mental characteristics of men have been taken as the foundation of a classification of the races; but few of these characteristics have been found to be sufficiently constant to furnish an in-

variable and scientific principle of division.

Color of the body taken as the fundamental characteristic.

In the present work the color of the human body has been taken as the most invariable criterion of race character, and on that fundamental fact, assisted by other physical traits and by intellectual peculiarities of development, particularly by the great fact of language, the classification has been made. This has been done on the hypothesis of the general unity of mankind and the derivation of all the races from some common source localized in time and place. The character and method of classification chosen as the basis of the present treatise on the races of mankind will sufficiently appear in the chapter devoted to that topic.

Having thus by preliminary inquiry investigated as well as we may the time, place, and manner of the beginning of man-life on the earth; having noted the primitive condition of mankind, and constructed a scheme of distribution and classification by which the various races may be viewed as a single fact with subordinate parts in proper relation to the whole; having described the migratory spread of the different tribes and peoples from the earliest movement of the race to its latest dispersion in the world, we shall next advance to the consideration of *the races themselves*. This theme will constitute the body of our work. In this we must discuss the characteristics, special features, and peculiar activities of the various divisions of mankind, assigning to each its proper place in the general scheme.

In entering upon this principal part of the treatise we shall, from the nature of the case, follow the already established classification, taking up the different races one by one until all have been considered. We shall begin with that which is clearly the most important division of mankind; that is, THE RUDDY, or WHITE, RACES. We shall see, first of all, the great *Aryan family* parting from its central locality in Western Asia into its Eastern, or Asiatic, and its Western, or European, stem. These we shall endeavor to follow, considering in turn the ancient and modern Iranic races, and afterwards the Indic Aryans, from the time of their establishment in the Indus valley to their modern developments in the powerful races of Hindustan. Then in order we shall follow the Western division of the Indo-European family, noting its emergence in the Hellenic, the Italican, the Celtic, and the Teutonic races. This department of the work will bring us into contact with the great classical nations of the ancient world. Since it includes essentially all the peoples of Europe, we shall here find those races in whom history has the most abiding interest. We must needs dwell long with the great Greeks, the Romans, the Celts, the Germans, and their descendent races in Europe and the West.

Ethnic history begins with Aryan family as most important.

The important Aryan family, however, is by no means coëxtensive with the White, or Ruddy, races of mankind. Of these the next general division is the *Semitic family*, second only in fame to the Indo-Europeans. We shall in proper order take up the ancient Semites and follow them from their earliest ethnic life in the valley of the Euphrates, through the great Aramaic and Hebraic developments, down to the modern Arabic evolution in Southwestern Asia. Afterwards the *Hamites*, of still narrower activities and race dispersion, will be considered, thus completing the cycle of the Ruddy division of mankind.

Semites and Hamites also belong to the Ruddy races.

Following this, we shall next find THE BROWN RACES, and pursue them from their ancient to their most recent phases of development. The inquiry will in this case carry us from the region of Beluchistan throughout Eastern Asia to the islands of the Pacific, to the three Americas, and indeed to the ends of the earth. In the course of this part of the inquiry we shall find our principal subject-matter in the great peoples of the Orient. There, in the Chinese group, we shall see massed under a single form of life about one fourth of the present inhabitants of the globe. To these must be added the Japanese, the nomadic races of Northern Asia, the Polynesian Mongoloids, and all of the American aborigines. The extent and variety of these materials will of necessity demand much space, and detain the reader with a multitude of important particulars relative to the present character of so large a division of mankind.

Brown races to be considered as next in importance.

Still pursuing the general classification of races, we shall come at last to THE BLACK DIVISION of the human family. This, though the least important, is nevertheless of much interest as completing the general scheme, and as furnishing a large numerical fraction of the population of the globe. Our course of study will here lead us through the vast belt of Equatorial Africa; thence into the southern parts of that continent; thence eastward in the course of the Pelagian Blacks as far as Australia, New Guinea, Fiji, and the Philippines. The excursion is thus world-wide in its sweep—omitting from consideration no country or important island of the earth.

The Blacks are last in the ethnic scheme.

It still remains to be inquired what *the true materials* are which must constitute the body of an ethnic history. This question has respect to all of the essential elements of the human evolution. But what are these elements? By what agencies and through what phases of life and action do the races of men pass in their progress from the unconscious estate of primitive barbarism to the conscious estate of the civilized life? These agencies and elements of the development of mankind we have attempted to discover and to set forth in the following pages. We shall find that the first great fact to be considered with respect to the development of any given division of mankind, or indeed of the race as a whole, is *the means of subsistence*. This takes into consideration the environment, and in particular the food-supply, of the given people. It views those elements of the natural world of which man avails himself in order to live and flourish, and which reäct so powerfully upon his faculties and frame. We shall not, therefore, neglect to notice the material basis of the race-life of the various peoples, and to make comparison of the resources of one race with those of another.

True materials of race history; means of subsistence.

The next fact or element in ethnic history is, in general, *the relation of the sexes* and the institutions founded thereon. There must in the nature of the case be a method of union everywhere and under all conditions for the perpetuation of the species. The importance of this fact has been greatly overlooked or blinked by historians, even by those who have essayed somewhat the ethnic problems ever suggesting themselves to the mind. The fact and the manner of marriage are of great and primary importance in determining the character and institutions of every race that has flourished or that still flourishes on the earth. On the sexual union and the

Relation and union of the sexes next in importance.

manner of it is founded the family, and out of the family spring a great number of social forms, involving most intimately and radically the whole character, tendency, aspiration, and development of the given race. It will be a part of our purpose in the present work not to neglect the adequate discussion of the methods of the sexual union adopted by the different races, and to show the place of marriage and the institutions based upon it in human progress.

Following close after this division of the subject, we come to *language* as an element of ethnic history. Man has a material and an immaterial part. The immaterial part has for its function thought, and thought has for its organ speech. Man is a speaking animal. No other characteristic of his nature is more universal or prevailing. Speech is the invariable index of the intellectual and moral condition of the human kind. Language has varied according to race, showing most plainly the wide range of aptitudes and intellectual powers possessed by the different races. Speech has differentiated just as mankind has separated into divisions and local developments. The fact of language thus lies close to the general scheme of human dispersion. The one illustrates the other, and the other exemplifies the first. We shall, therefore, in this treatise on the races of mankind have much to say on the linguistic developments and phenomena of each.

Important place of language in ethnic history.

From language we advance to *arts and technology*. Man is the being that has the power of conceiving and executing workmanship. We speak not of the fine arts in particular, but of the industrial and commercial arts. To these even the barbarian begins to turn his attention. All accomplishment in this direction arises out of that semi-ideal faculty which enables the possessor to adopt means to ends. It is from this source that man derives his disposition to work in the metals, in wood, in stone, and in that large class of materials that are used in the production of fabrics. Ethnic history considers mankind in such activities as are requisite to the industrial pursuits. It regards the human being as a maker —a maker of houses first, and of all things afterwards. It considers him as a builder of structures, a miner, a metallurgist, a planter, a weaver, a tanner of skins, a fashioner of weapons and implements, an engraver of gems. At length ethnic history views man as he emerges into the domain of the higher arts. Here he becomes truly ideal. Here he adorns as well as constructs. Here by the use of color and form he gives outline and substance to the things perceived in vision and dream.

Practical and fine arts an index of race character.

It should here be noted that the art products of mankind, whether industrial or ideal, may be viewed from two points of observation. The first considers them in themselves as things of importance without respect to the instincts and genius that produced them. The other view considers them as illustrative of the desires and ambitions of the makers. In this sense they cast a strong light on the character and dispositions of the peoples and races by whom they have been produced. It is this consideration that gives them value in ethnic history. They show *what kind of being* it is whose ingenuity and industry are capable of effecting such results. It is for this reason that ethnic history, as well as the general history of nations, takes into account the arts and industries whereby life is so greatly bettered and amplified.

Arts may be considered in themselves or as indicative of man.

General history regards architecture, metallurgy, all manner of construction and fabrication, as facts in themselves useful and important, contributing to the strength of nations; but a true study of the human race regards all art products as but an evidence and illustration of the character, the skill and purpose of those by whom they were designed.

In like manner *government and laws* are human institutions that may be considered in themselves. As such they are objective products of the genius of man. But they are also illustrations of the character, sentiment, hope, and ambitions of the race. The existence of government and laws among all the peoples of the world is of itself sufficient proof that such facts are native to the instincts, desires, and capabilities of mankind. It is because they are so that the ethnic historian, as well as his competitor, devotes his thought and space to the consideration of the governmental and constitutional aspects of human society. The story of the races of mankind could by no means be complete without introducing therein careful accounts of the laws and organized governments which the various peoples have adopted. But it must be borne in mind that such consideration of civil and legal institutions is given because they illustrate the genius and political skill of mankind.

Governments and laws also exemplify human genius.

Still another topic to be considered as a part of the revelation of race character is *religion*. The religious instinct is found to have been deeply implanted in nearly or quite all the peoples of the world. This was true in the dawn and morning of history, and it is still true at the high noon of nationality, power, and greatness. Here, again, we do not consider religion and religious institutions as objective entities bearing their interest in themselves, but as facts tending to illustrate the totality of human nature. In ethnic history religion, whether it presents itself in the form of gross superstition or as a more enlightened concept of the supernal powers, or in the shape of institutions having for their object the systematic and visible administration of rites and the teaching of the doctrines of a given faith, must needs occupy a considerable space, inasmuch as it illustrates some of the most universal and constant features of man-life on the earth. In the present treatise care is taken, in the consideration of every division of mankind, to note its religious instincts and practices, as well as to delineate those institutions which are founded on the universal sentiment of religion among the various peoples.

Religion in like manner shows the character of peoples.

Finally, we shall consider what may be called *the proper ethnic characteristics* of the human race. These relate to those specialized and distinguishing traits in the physical, mental, and moral constitution of mankind, whereby one people is discriminated from another. We have seen how it is that bodily features, such as color, peculiarities of anatomical structure, the hair of the head, the facial angle, the cranial capacity, and many other visible facts in man-life, have been taken as a basis in classifying the human species into kindreds, peoples, and races. The identity of feature is thus used as the principle by which the classification is determined. Like distinguishing features or traits appear in the mind and in personal activities. Another class of similar facts may be found in the deeper spiritual parts of human nature. Upon all of these the ethnic historian will dwell with interest, as they are of the essence of the inquiry.

Ethnic traits proper distinguish race from race.

It is in this order that a history of the races of mankind may be best constructed. In the present work such order has been followed throughout, with only slight deviations in this part or in that, as the same have seemed to be demanded by the nature of the subject-matter. While absolute uniformity in all parts of the treatise has not been desired or sought after, the general plan has been faithfully pursued as the same is outlined in this introduction.

Summary of subdivisions of the present work.

From the various topics herein presented—arising out of the nature of the subject and constituting the body of our study—the following synopsis of the whole may be deduced:

Book I.—A Preliminary Inquiry into the Time and Place of the Beginning of Man-life on the Earth.

Book II.—An account of the Manner and Conditions of the Appearance of Mankind.

Book III.—An account of the Primitive Estate of the Human Race.

Book IV.—An account of the Early Migrations and Dispersions of the Different Divisions of Mankind over the Earth.

Book V.—An account of the Iranian Division of the Human Family.

Book VI.—An account of the Aryan Races of India.

Book VII.—An account of the Western Aryans, including the Races of Asia Minor and the Greeks.

Book VIII.—An account of the Primitive Italicans and the Romans.

Book IX.—An account of the Latin Races.

Book X.—An account of the Celtic Races.

Book XI.—An account of the Teutonic Races.

Book XII.—An account of the Norse, or Scandinavian, Races.

Book XIII.—An account of the Slavic Races.

Book XIV.—An account of the Aramæan Semites.

Book XV.—An account of the Hebrew Race.

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Book XIX.—An account of the Malayo-Mongoloids, beginning with the Thibetans and Burmese.

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Book XXI.—An account of the Malays Proper.

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Book XXV.—An account of the Northern Asiatic Races.

Book XXVI.—An account of the Polynesian Mongoloids, in their two divisions of Sawaioris and Tarapons.

Book XXVII.—An account of the American Mongoloids, beginning with the Northern Aborigines.

Book XXVIII.—An account of the Central and South American Races.

Book XXIX.—An account of the Black Races, beginning with the African Nigritians.

Book XXX.—An account of the Australians and Papuans.

In this order the themes of the following volumes will be presented

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PRINCIPAL TYPES OF MANKIND. (After Huxley.)

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II. **Nigritian**: 3 Woman of the Loango (drawn by *Falkenstein*). — 4. Man of the Darfur (drawn by *Hagenbeck*, from a photograph).
III. **Negrito**: 5. Man of New Hebrides (drawn by *Godeffroy*). — 6. Woman of Tasmania (drawn by *Von Bülow*, from a photograph).
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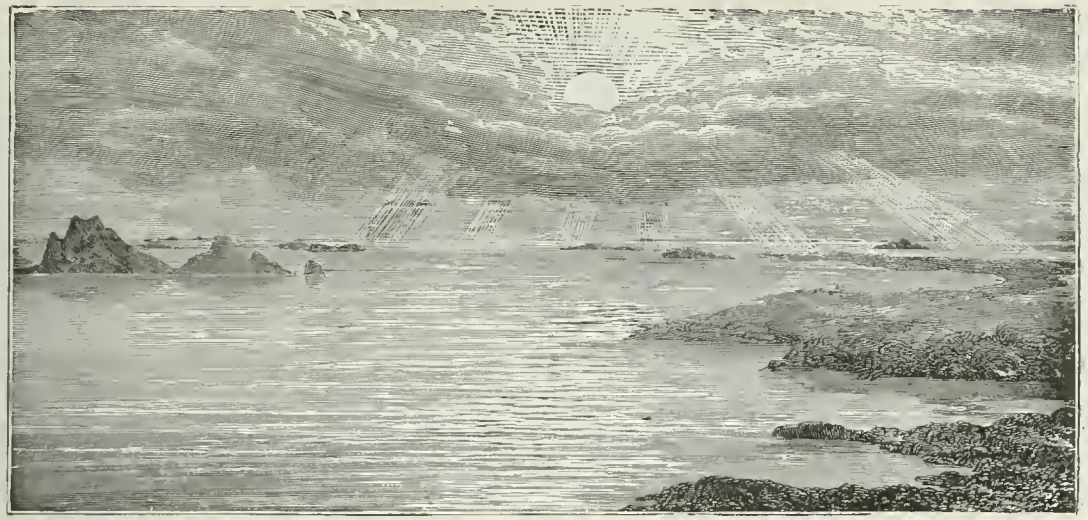


Part First.

PRELIMINARY INQUIRIES.

BOOK I.—TIME AND PLACE OF THE BEGINNING.

CHAPTER I.—SOURCES OF INFORMATION.

IN entering upon the history of mankind, considered as a race, certain questions fundamental to the subject naturally suggest themselves to the inquirer. They obtrude upon his attention. If neglected or put aside they recur from time to time, as if to arrest the narrative, until fitting answers are given. They haunt the mind and shadow the scholar's study. They flutter about the poet's dream, and cross on rapid wing the philosopher's landscape. They fly abroad, and come unbidden into the thoughts of the great people. Even in the most practical of all ages and the least speculative of all nations these questions are heard and repeated in many accents and by many tongues. He, indeed, is of dull apprehension and little curious to know the cogitations and dreams of his fellow-men who has not discerned their anxiety to find a solid basis of fact and reason in what may be called the principia of human history.

The three fundamental questions of historical inquiry.

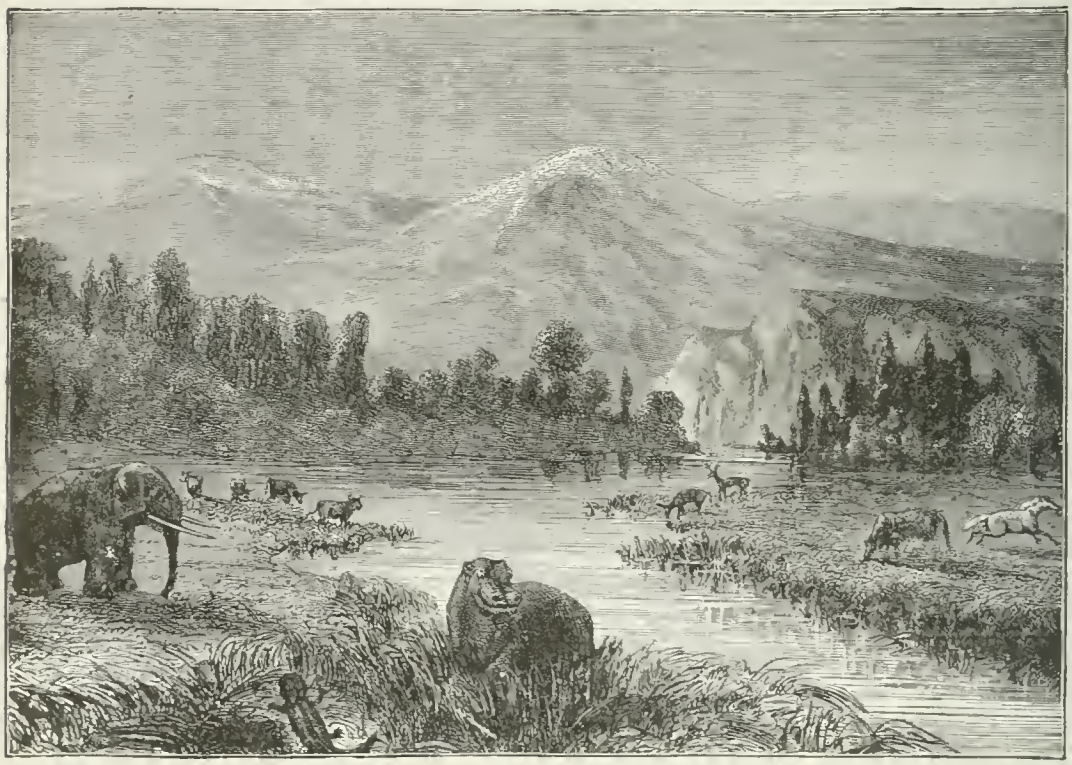
The principal of the questions to which we here refer are three in number:

1. At what Time in the past—exact or approximate—did the human race begin its career on the earth?

2. In what Place—that is, in what region or regions of the earth—did mankind first appear?

3. What was the Method—the manner, the process, or processes—by which man came into conscious being on our planet, rising into rationality, asserting his sway as the principal inhabitant of the earth, and discovering in himself the ability to consider his own thoughts and actions as a study in natural history?

These questions, we repeat, may not exhibit in his feeble intellectual activities at least the premonitions of curiosity about the genesis of his tribe—the origin of his kindred and himself. As for him whose thought and imagination under the inspiring influences of the civilized life have taken wing across all floods and continents, how keenly, how eagerly does he in his flight glance eagle-wise to



LANDSCAPE OF THE PLIOCENE PERIOD.—Showing Environment at the Time of Man's Appearance.—Drawn by Riou.

be easily put aside. It is in the very nature of man to inquire diligently and persistently into the time, the place, and the circumstances of his own origin. The disposition to search all the fields of knowledge in quest of light on these inquiries is as universal as the human race. In some the impulse is stronger; in others, weaker; but in all it exists. It might be difficult to find in any quarter of the earth a barbarian so low in the scale of mental development as not to

Eagerness of man to ascertain the facts of his origin.

right and left in the hope of discovering the true beginning and fountain of things!

In what spirit, then, should these great and vital questions be approached? Certainly in the spirit of humility. The honest inquirer must recognize from the first hour of his research the nature and limitations of his own powers and the uncertainty of all the sources of information from which he must draw his materials. Honesty, also, and freedom

True spirit in which such an inquiry should be approached.

from prejudice must be his. Sincerity of purpose must guide him on the way. Singleness of aim must light his course. Fidelity must steady his thought and hand. Simple love of changeless truth must be his inspiration. His great object and passion must be to enlarge somewhat, if he may, for the benefit of his fellow-men the existing treasure of human knowledge; to widen and clear the landscape toward which so many earnest eyes are directed. Not, indeed, to establish some foregone conclusion; not to verify some little prejudice; not to shore up some tottering fiction which the ignorance of men has reared — is the aim and end of the questioner, the real student, the faithful delineator of the concepts and judgments which he has formed of the truth. Not, on the other hand, is it part or purpose of his work to assail, to destroy, to obliterate the existing forms of knowledge and belief, or to disturb with wanton hand any of the oldtime concepts which the mind of his ancestors has evolved as the best expression of its hopes and fears. But rather must the true inquirer hold all things in equal and steady balance. With dispassionate purpose he must consider and weigh every existing fact — every form of human thought and belief, every tangible institution and practice of mankind.

But in what attitude does man stand with respect to the time and place of the beginning? What is his condition of mind relative to the problem of the method and circumstances whereby mankind began to be on the earth. Perhaps the best of all analogies bearing on these great questions are drawn from the individual life and experience, from the recollection which each member of the race has of his own origin and of the conditions under which his existence was begun. This is a consideration which has been astonishingly neglected. The experiences of the individual man with respect to himself are so obvious that he has failed to note their significance with respect to the larger problems of his tribe and race. If we take our stand, as it were, inside of ourself, and look backward along the lines which we have traversed from our individual beginning in the world, we shall find those lines converging in the distance, first into youth; then still more narrowly into childhood; and finally to a point in infancy.

Individual life furnishes a clue for investigating the race-life.

As we look steadily, patiently, in the direction from which we have come, we see that the nearer landscape of our life is flooded in every part by the broad light of consciousness. Further down the converging lines the light is less abundant, the objects less distinct. Here and there already in the second decade of our life memory begins to fail; the clue is lost, and we discover many patches of obscuration, many parts in which the light rests only on the rim of the hills or on one side of the forest. The valleys and depths and remoter fields fade into twilight, indistinctness, and thick mist. Further on, and near the beginning of the first decade, only a few luminous points are discoverable. The father's face, the brother's pudgy hand, the mother's blessed bosom are still seen; but beyond that the obscuration is complete. We know, indeed, from testimony *aliunde* that we *had* an existence beyond the point to which the utmost stretch of memory can reach. We also know from observing the infancy of others that our own state for the first two years or more of our being was one of utter unconsciousness. It

What may be discovered in the backward look.

was a state of mere potentiality and growth. No genius, not even the powerful soul of Plato or Shakespeare or Goethe, has been able by the backward look to pierce the impenetrable shadows of his own infancy; to know by experience what manner of creature he was at the beginning; to declare by direct knowledge through what stages and moods of evolution and tentative flight his own infant spirit first raised the wing and sought to journey through the boundless air.

But, as we have said, we are able to discover much of interest with respect to the epoch of unconsciousness in the beginning of our own individual lives. We were *observed* in that stage of our existence by our parents and kinsfolk. The nurse was busy with her eyes and her garrulous tongue. Tradition was rife in the family and neighborhood relative to ourselves. The first motions of intelligence were noted by those who were keenly anxious for our welfare and promise. Tales were told about us, having their origin in truth and their ornaments in loving fiction. Presently, with the dawn of consciousness, this nursery history of our lives was recited in our hearing, and we imbibed it as the true narrative of our previous career—but by no means sufficiently wonderful to meet the demands of fancy. Therefore must we ourselves expand and exaggerate the story. We became interested in our past, and carefully stored the vivid memory of childhood with the poetic and half-fanciful stories of our former state. Thus around the life of every youth are thrown the traditions and legends of his own unconscious existence in infancy; and these forms of half-knowledge he is constrained in after years to accept and to use as the best attainable evidences of his progress by growth and evolution through the first epoch of his being.

Methods of knowing the history of the unconscious epoch.

From all this we are able to draw some useful analogies with respect to the infancy of the kindred to which we belong, the people of which we are the individual parts, and finally the race of mankind within which we are included. It is only in recent times that these analogies have come to be regarded at their true valuation. More and more it has come to be accepted as true that the individual is the epitome of the species to which he belongs. More and more the reasonableness of that hypothesis has become apparent which places the life of the race in analogy with the life of the individual. More and more we have been able to detect in the various stages of our individual lives the likeness and miniature forms of the corresponding stages in the history of the human race. Some of the ablest and most satisfactory expositions of the great fact called civilization—of its origin, its materials, its conditions, its growth, and tendencies toward maturity—have been produced by the process of comparisons instituted between the life of the individual, the life of the species, and the history of the race to which he belongs.[1] With these facts, however, we are not at the present immediately concerned.

Useful analogies; the individual an epitome of race.

If, then, the human race may be looked upon as an individual entity or being, having an unconscious infancy, a half-conscious childhood, a wholly conscious but erratic and visionary youth, and a rational and reflective maturity,

Sources of light and information for the present inquiry.

[1] Draper's *Intellectual Development of Europe* is the finest of the treatises in this department of modern inquiry.

what facts or circumstances, what conditions of knowledge may be said to exist from which evidence and information may be drawn concerning the earliest stages of human existence—that unconscious and infantile condition beyond the reach of all ethnic memory—beyond the horizon of light and vision? Are there any sources of thought and reflection, sufficiently matured to take the name of knowledge, from which, as if by a mirror, light and intelligence may be thrown into that remote region below the dawn of our race-consciousness?

ORIGIN OF MANKIND—WHEN AND WHERE?
Drawn by Emile Bayard.

Fortunately—most fortunately—such sources of knowledge do actually exist. Most of them have been discovered in comparatively recent times. Several fields of investigation have opened their treasures to the human mind, and with every stage of the exploration new and valuable evidence has been gained relative to the great questions which we have placed at the head of this chapter. A whole group of sciences, growing ever more luminous with each additional discovery, have yielded their results, from which ever-improving generalizations may be drawn regarding the primitive stages through which the race of

man has come into its present state. The principal of these sciences are as follows: Astronomy, Geology, Archæology, Palæontology, Anthropology, Ethnology, Ethnography, Tradition, and History—the last named including the poems, the dim chronicles, and misshapen annals in which the records of the Ancient World are mostly contained—and finally Chronology proper.

Cycle of sciences that may be made to testify.

edge which considers the distribution, motions, and characteristics of the heavenly bodies. It has for its first and immediate subject the solar system, of which our own earth constitutes one of the minor members. Dating from the days of Galileo and Copernicus, the science has passed through several stages of development, the last of which, known in the language of our times as the New

Astronomy contributes important data for history of life.

BEGINNING OF THE CONSCIOUS LIFE ON THE EARTH.—Drawn by Riou.

At first view it may be difficult to perceive in what way the sciences here referred to can give any satisfactory evidence relative to the origin and primitive life of our race. But a more careful consideration of the subject will at once discover the bearing of the same, each and several, upon the great questions before us.

1. *Astronomy.*—By this science we understand that branch of human knowl-

Astronomy, has concerned itself particularly with the ultimate constitution and philosophy of our own solar group, and, indeed, of the whole sidereal heavens.

One of the branches of this great theme has been a specific inquiry into what may be called the Order of Creation. The subject embraces, in the half-poetical language which it has adopted, such topics as the birth, the youth, the

Order of vital creation determinable from world history.

maturity, the old age, and the death of worlds. The stages through which planets—all planets—pass in their evolution from a primordial condition into worldhood have been determined with such an approximation to certainty as to furnish a clear concept of planet history. The inquiry has entered still more profoundly into the subject, showing that world-growth is correlated in all of its stages with certain possibilities of life. More precisely it has been shown and determined that the great fact called life is related with a certain stage or stages of planet growth, and that the former does not and can not exist except under the conditions which are present at those stages of world development.

This signifies in exact language that the infancy of a planet can not bear life. Many of the conditions then present are utterly incompatible with the existence of vital phenomena in any form. It is doubtless true that every planet passes through a series of primary evolutions, tending ever to worldhood proper, before *any* forms of life can exist therein. At a later stage certain forms of vital existence appear, and still further on higher orders, until at length animated existence, properly so called, is seen in the new world, inhabiting its surface, teeming in the waters, or traversing the air. We are thus introduced in planet history to what may be called the Epoch of Life.

The Epoch of Life is adjusted to certain stages of worldhood.

In the latter part of this epoch intelligences such as ourselves, a race like mankind, may appear and find the means of continuity. For a period of variable but great duration this high form of animated being, intelligent, conscious, rational, becomes the principal inhabitant of the planet under consideration. Speculative astronomy does not hesitate to go beyond the limits of this period, and to point out the old age of worldhood, the disappearance of life from the planet, and, in a word, the death of the exhausted sphere. In so far as investigation, the principles of right reason, deductions warranted from existing data, and conclusions reached by scientific methods may go toward determining the past and present condition of our own planet with respect to the Epoch of Life, —to that extent is the science of astronomy available as one of the sources of information relative to the age of the human race, the date of the infancy of man, the time of the beginning.

2. *Geology.*—Close after this astronomical view of world-life and man-life comes the science of geology, with its vast treasures of information and suggestion. Geology takes up the investigation of planet life where astronomy leaves off. The latter deals with worlds in their relation to each other, and incidentally with world constitution. The former investigates the history of our own earth in particular. The object of this field of inquiry is to trace the progress and development of our planet from the date of its separation from the primordial mass of matter through all its stages of evolution down to its present condition. Such a field of inquiry involves the consideration of the physical bases of all forms of earth-life. It is out of geological relations and conditions that all vital phenomena arise. Given a thorough establishment of geological knowledge—a complete determination of the succession of events in our world history—and the true place of vital phenomena therein can be determined with approximate certainty.

Geology indicates the order and place of vital phenomena.

The successive stages in the history of our planet are correlated in every part

with the successive stages in the history of life. The position of our own race in the general scheme is determinable by a careful observation of the succession of facts and events in the physical order of the planet. The earth has received the markings and the vestigia of all the orders of life, each in its turn, and has fortunately preserved, as if for the wisdom of after ages, very intelligible fragments of testimony respecting the time and circumstances at which each new order of living beings began to exist, and the successive stages through which the same passed in its differentiation, growth, distribution, and maturity.

The earth preserves the vestigia of vital phenomena.

3. *Archæology.*—Just as geology lies back upon astronomy for its foundation, taking up the history of life where the latter leaves off, so archæology rests in turn on geology. Whatever evidences of the existence and sequence of vital phenomena have been left in the astronomical and geological records of the universe have been in the nature of tracks, traces, impressions, which, while they are sufficiently distinct and unmistakable in character, are not in the nature of remains left behind by the living beings that have inhabited the earth. They are thus considered by the two sciences referred to as the testimony of the former presence of things unseen. Besides such markings and indentations, so to speak, which the creatures endowed with life have left in the organic structure of nature, there are many direct remains of the living beings that have flourished in the different epochs of world history.

Place of archæology, and its subject-matter.

Our own race has done its part in this respect. The earth is full of *reliquæ humanæ*. This is to say that the race of man has left its débris behind in every part of the world where human beings have existed. It has been in the nature of the ingenious and highly intellectual beings of whom we are ourselves the living exemplification, from whom we are descended, with whose methods of life we are so intimately acquainted by experience and observation, to handle the materials of nature, to modify them, to adapt them to various uses, and then, with death or removal, to cast them aside. Human relics are thus scattered far and wide on the surface and under the surface of the earth. Many of them are of imperishable materials. They survive, not only for years and for centuries, but for immeasurable eons of time. Nor is it possible that the existing race of men should be mistaken as to the origin and character of this large detritus of the human race. It bears in all its parts the marks of an unmistakable intelligence which divides the relics of man from the remains of all other creatures.

Reliquæ humanæ; nature of the relics of man-life.

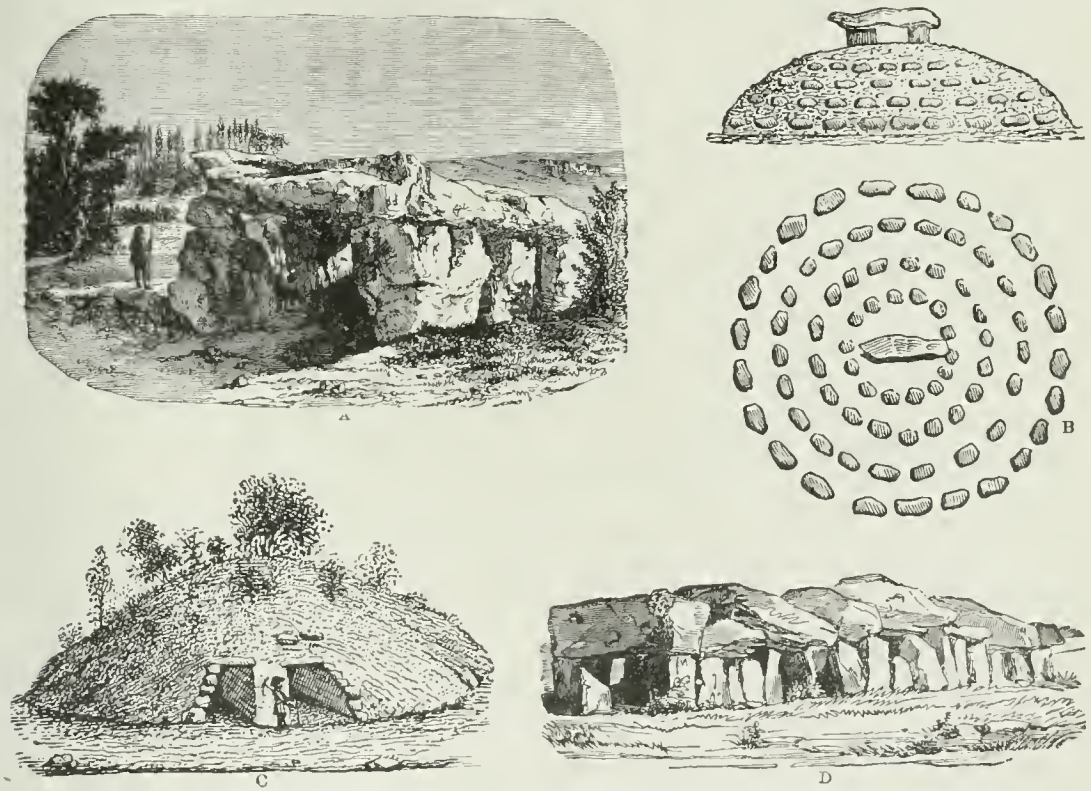
Within the present century the scientific consideration of the reliquæ humanæ has been undertaken. That vast and important domain of knowledge called archæology is the result. In its application it is partly prehistoric and partly historic; that is, one branch of the inquiry reaches far back into the geological history of our planet, covering the period anterior to the first expressions of human consciousness in the form of traditions or written records. The other branch relates to the conscious period of our existence as a race; that is, to the epoch which has been covered more or less perfectly by those annals and monuments which men have invented as the means of expressing and preserving the story of themselves.

Historic and prehistoric applications of archæology.

In its methods and principles, the science of archæology confines itself strictly to the works of man. These are considered with respect to their geological surroundings. The scheme of geology being understood, the relics of the human race are estimated by their juxtaposition and character. The flora and fauna of past ages, the order of have been exercised. It thus happens that archæology furnishes to the inquirer much valuable and almost direct evidence as to the time when mankind, as a race, began upon the earth.

The science considers the ordo of facts in the history of life.

4. *Palæontology.*—Closely related with archæology is the next branch of inquiry, palæontology, which treats of the structure, affinities, classification, and distribution of the prehistoric plants and ani



ARCHÆOLOGICAL EVIDENCES OF MAN'S EXISTENCE.

A, megalithic covered structure; B, stone circle—horizontal and vertical views; C, mound with stone entrances; D, megalithic ruins of causeway

which has been already geologically determined, holding the remains of man's work and workmanship in a matrix, furnish therefore an ordo which can not well be misapprehended. The bottom principle of the science is that there is a definite correlation between all the arts in the various periods of human development and the world history in which and on which those arts

mals which have existed on the earth. These are classified and arranged according to the natural order in which they have succeeded one another as species of living organisms. The relations between plant-life and animal life are established, and the dependencies of animate upon inanimate forms of existence scientifically determined. Not only the surface

Scope and limitations of palæontology.

of the earth, but the crust of the earth to a considerable depth has been explored in the investigation; so that palæontology, like archæology, of which it is properly a branch, may be said to rest firmly on a geological basis. In its after developments it yields the two sciences of botany and zoölogy, each of which has its roots and historical antecedents in the prehistoric and extinct flora and fauna of the earth. At many points palæontological research touches the existence and conditions of man in the geological and archæological ages. It considers him, indeed, as the culmination of the animal races whose antiquity is in the rocks and whose present activities are displayed on the dry land and in the waters of our globe. The science thus furnishes another of the collateral and contemporaneous evidences of the primitive state of man, and incidentally of the epoch at which our race appeared on the earth.

5. *Anthropology.*—Still a fifth science has recently been developed which in some of its subject-matter touches the great question of the antiquity of man. This is anthropology. The nature and limitations of this important branch of inquiry have scarcely yet been clearly defined. It considers the race of man as a fact in natural history. It looks at the race, first of all, from the physical, or material, point of view. It considers the form and structure, the adaptations and relations of the beings called men, as though they were a genus of animals. Anatomy and physiology thus become subordinate branches of a higher anthropological study. But the new science also brings into view the intellectual and moral nature of mankind. It considers the evolution of mind and all of those important facts and principles which in their scientific expression go by the name of psychology.

Anthropology makes man himself its subject-matter.

The inquiry also extends backwards along the lines of human development, and becomes historical in its character. It investigates the various stages through which the race of man has passed. It follows the clue in the direction from which that race has emerged until it enters the domain of archæology, and with that science divides the prehistoric relics of mankind. The line of division is made on the principle that the remains of what man has *done* shall fall to archæology, and the remains of what man *was* to anthropology. The two sciences are thus allied, the one rising out of the other in the same manner in which archæological investigation springs from a geological basis.

And divides with archæology the relics of mankind.

It has long been known that the remains of men have survived from the prehistoric ages. Such remains are, for the most part, osseous in character. It will be seen at a glance that such relics are strongly discriminated in their nature from those which consist of the fragments of man's workmanship, as, for instance, his implements, utensils, apparel, etc. While it is true that, for practical purposes, the skull or other part of a prehistoric human being and the hatchet of stone or bronze which the prehistoric man was wont to wield in his battles for existence may be considered together as common evidences of his existence, and, in a certain degree, of the time at which he flourished, yet the two relics, as will be seen at a glance, belong really to wide apart branches of investigation. The one is a part of the organic structure of the man of the archæological period, and the other is a part of what may be called his civilization

Two classes of remains of man's presence and activity.

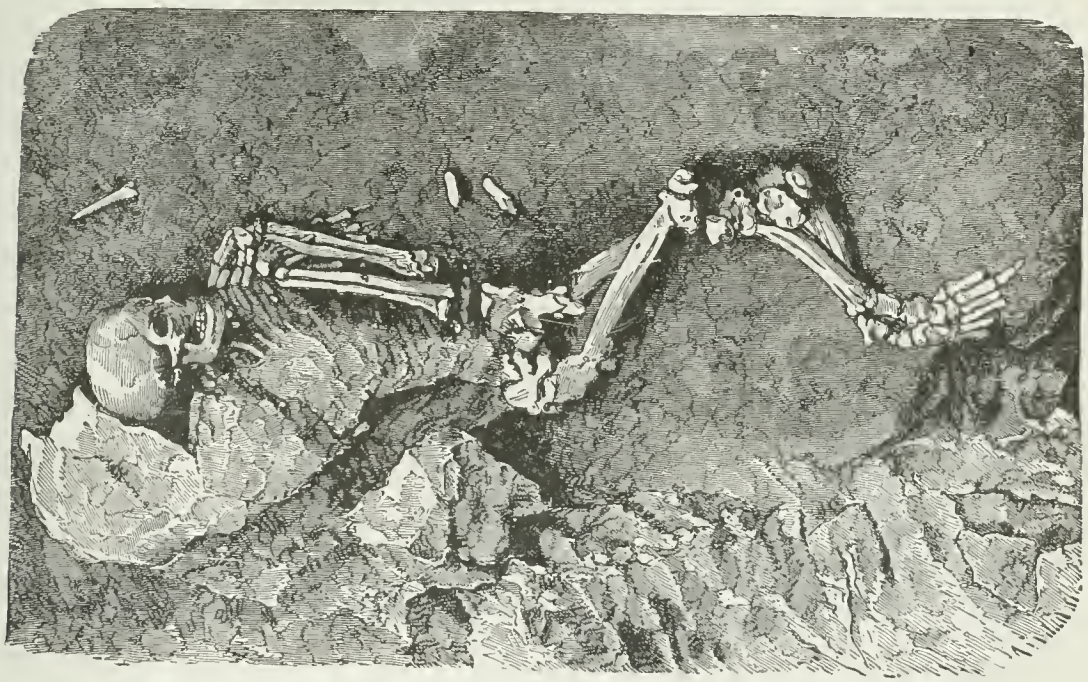
The significance of the one is anthropological, while the other is a part of the subject-matter of that prehistoric history called archæology. It will be seen in the following pages to what extent anthropology, the study of man as man, has thrown light upon the date of his origin—the time of his appearance on the earth.

6. *Ethnology.*—Springing out of the last-named department of investigation, and constituting in some sense a subordinate division thereof, next follows ethnology. This includes a specific department of study, the subject-matter of which is the different tribes, kindreds, and races of men that have inhabited the earth, considered in their relations, affinities, derivation, descent, and general characteristics. Ethnology is a truly philosophical inquiry into the origin, differentiation, development, and distribution of the different families constituting the originals of the present races of men. It deals with the physical conditions under which mankind have existed; the stages of culture through which they have passed; the various aspects of social life which have presented themselves in different ages; and with the universal laws of progress in accordance with which our species has moved forward from the most primitive to the most recent stage of the human evolution.

Ethnology springs from anthropology; its materials.

Beginning with the most rudimentary arts which were invented and practiced by men, and with the coarsest needs by which the primeval race was pressed and held in thrall, ethnology proceeds confidently by comparison, by hypothesis, by analogy, along the lines of growth and expansion until it reaches the grand discoveries and noble impulses which constitute the ripe fruit of the most recent epochs. The science is patient and laborious in its methods. It stoops to consider the food-supply whereby human life, in common with all other animal

Deals with evolution and phenomena of race-life on earth.



REMAINS OF PREHISTORIC MAN.

life on our planet, has been supported and perpetuated; the sexual relation, being the general term to express the methods and practices of the various tribes and peoples as it respects the union of the man and the woman for the increase of the race—the laws and the sentiments under which the sexual alliance has been sanctioned and encouraged by eral rules of conduct which men by experience and right reason have invented in different ages for the subordination of themselves in communities and states; and finally, the religious systems which have appeared in many forms, but with many common features, as the expression of the hopes, the fears, the beliefs, and yearnings of the human spirit in its

PRODUCTION OF FIRE—THE FIRST ART PRACTICED BY MAN.—Drawn by Emile Bayard.

mankind on the way from rude savagery to a highly civilized condition; the phenomena of language, including a study of the affinities and connections of the different tongues in which the families and kindreds of men have endeavored to give a rational embodiment to their thoughts, beliefs, and visions; the technology, or art interpretation of the various peoples; the government, civil and social, and the laws constituting the gen- discontent with the things seen and its aspirations for the things eternal. Following the clues furnished by ethnological research, the inquirer is enabled to make his way along the course from which men have descended, and to learn much of the time and circumstances under which the race began its existence on the earth.

7. *Ethnography.*—It has been proposed by modern scholars to separate that part

of ethnology which describes the customs, laws, and habits of nations from the principal science, and to name the new division ethnography. Of this branch of inquiry it is the proper function to describe the phenomena of race rather than to explain the same in terms of the known. The office of the one is delineative; of the other, expository. To the one belongs the descriptive and pictorial part of race inquiry, and to the other the philosophical interpretation of the things described. The relation of the two sciences is analogous to that existing between geography and geology, though the difference between the latter is more pronounced and conspicuous than that between the former. The ethnographic inquiry is much more easy and superficial than ethnology, inasmuch as the latter looks more profoundly into the subject-matter of the investigation, and must proceed by wider and more difficult generalizations.

Narrower and more special field covered by ethnography.

The data of man-life obtained by mere observation and description are easily classified and arranged according to the nature of the subjects to which they refer. But the interpretation of the great facts in which the origin, the character, and, in a word, the history of the different races of men are embodied, requires a breadth of research and a scope of vision worthy the name of genius. In so far as ethnography preserves by careful delineations the characteristics of primitive peoples, in so far as the science notes the rate of departure and the extent of the divergencies among the ancient races of mankind, to that extent it affords valuable suggestions relative to the time of the beginning.

Ease of classification and difficulty of interpreting.

8. *Tradition and History.*—We have now followed the lines of scientific evolution from a high view of world history downwards to man history proper. As in the case of the individual, there comes to pass a time in the progress of kindred and tribe and race when consciousness appears. When this happens in the individual, he at once begins, as we have seen, to consider himself, to remember with more or less distinctness the principal events in his past career, to speak of them as matters of importance to himself and others. In like manner the rise of ethnic consciousness leads at once to that peculiar, reflective, and communicative form of mental activity which we call tradition and history. When the proper stage has been reached, the tribe that was, becoming a people, begins to consider itself. The wisest members of the ethnic family, the most vigorous in thought and imagination, frame from the vague legends that have drifted downwards—assisted in rare instances by the monumental evidences which their race has left behind—at first an incoherent, and afterwards a coherent, account of the past.

In what manner tradition begins to be evolved.

Tradition and history thus become the first formal expression of national consciousness. Such expression is older than any other form of literary product. It may be indeed that the earliest story-teller of mankind takes for his legend the vehicle of metrical language, but the subject-matter is essentially historical. The man-life thus begins to be delineated. Of a certainty everything is at the first local and peculiar. The myth-making power is busy in the production of the narrative. Fact and fiction are equally present in the concept and the work. The historian of the dawn is at once a sage and a bard, an annalist and a rhapsodist, a story-teller and a singer. What

Blendings of tradition and history in the dawn.

he produces blends henceforth with the memory of his race. It is imbibed as a verity, and is used by future chroniclers and poets as the subject-matter of their work. The volume of tradition expands rapidly, and is to a certain extent rectified by the improving judgment and critical skill of after times. But ages go by ere the elements of myth and tradition are eliminated from the narrative. Mankind advance to the possession and civilization of the great continents. Other branches of knowledge spring from the mental fecundity of the race. Nations reäct upon nations. A vast civil and political life appears. The mind improves by culture and discipline; and yet the fictitious part of the early history of mankind continues to flow in the mighty stream of history and to color all its waters.

But what is the difference between history and tradition? Is not the one the other, and the other that? Is it possible to discriminate with exactitude between that form of intellectual product which goes by the name of tradition and that other form which is called history? May these two parts of the intellectual work of our race — its history and its tradition—be separated the one from the other and be considered apart? Certainly the two facts to which these terms refer are not the same fact; and yet the blending of the one with the other is so

A CHALDEE RHAPSODIST RECITING (MODERN).—Drawn by Barbant.

Distinctions to be drawn between tradition and history.

intimate and universal as almost to preclude the division of the one from the other. Tradition is a general term, signifying any form of story relative to past events which has been transmitted from generation to generation simply by the vehicle of human memory and oral utterance. Tradition depends for its existence upon the two faculties of memory and speech. It is perpetuated by repetition. True, a tradition may be written, and may in this manner come at length to masquerade in the form of history; but the fact that it is written does not alter its essential nature. If the subject-matter have been handed down by memory and oral narration, repeated from one age to the next, the character of tradition in the thing narrated is ever afterwards present, though it be written.

From this consideration it will at once appear how variable is the value of traditions as measured by the length of time between the date of the thing constituting the subject-matter of the story and the date of the record in which it is contained. If a great period of time have elapsed between the one and the other—if the tradition have thus been subjected to the modifications, exaggerations, and reflections to which all stories are subject so long as they dwell on the tongues of men, then, indeed, is the tradition of small importance considered as a material of history. But if, on the other hand, only a single generation or a fraction of a generation have intervened between the date of the event and the record which preserved the story, then we may allow to the tradition a weight almost equal to that of true historical narrative.

Variations in the authenticity and value of traditions.

The question will at once arise, Is not all history dependent upon or rather derived from a traditional origin? Of a certainty every narrative, however immediate and exact, must have passed through the medium of consciousness in the author, and to that extent it is tinged with the quality of tradition. But if the author, while the event is still immediately present to his memory, makes record of the fact which he has seen and known, if he follows the criterion to which Æneas so confidently refers, and speaks only of the things "of which he has been a part," then, indeed, is the traditional element so slight that it may be well neglected. Cæsar in his tent by night recording the incidents and results of the day's conflicts, thus becomes the exemplar and type of the historian and his work pure and simple.

How history arises from traditional lore; the definition.

But of a certainty many other qualities besides this of the contemporaneity of the witness and the event must enter in before the work can be called true history. The definition of this great and important form of human knowledge and achievement narrows from age to age and becomes ever more exact. At the present day it is limited to that species of authentic narrative of human events which is arranged on the lines of the forces which produced them; that is, on the lines of universal sequence and causation. Chronicles and annals, merely such, are no longer considered as history proper. Neither is that form of dissertation which embodies the speculations of a writer with regard to the facts and tendencies of human society to be reckoned as true history. The latter implies that the personal element in the narrative shall be as little discoverable as possible. The historian in the ideal history is as little seen as Shakespeare is seen in the tragedy of *Hamlet*.

The historian is an interpreter of events; but the interpretation is not colored—does not suffer diffraction—by the medium through which it passes. The camera is essential to the photograph. The easel, the palette, and the brush, aye, the arm and hand and eye of the master are essential in the production of a painting. But the camera is not seen in the sun picture; neither are the easel, the brush, the hand, and the eye of the artist seen on his canvas. So also of the historian. Beginning where tradition leaves off, freely employing every form and product of human knowledge, gathering in materials, especially from contemporaneous annals, chronicles, dramas, and fictions, he discovers wherever he may the threads of causation, of antecedence and consequence, and along these fine nerves of the man-life he builds his narrative on the principle of the photograph or the reproduction of a landscape.

Impersonality of the historian; sources of his materials.

But the thing which we are here to consider is not so much the essential nature of tradition and history, not so much their differences and dependencies, but rather the testimony which these two forms of human knowledge may bear with respect to the time of the appearance of our race on the earth, the date of the beginning. It is in the nature of tradition, then, to deal directly with these great questions. The brain of the primitive man was rife with conjectures and dim memories of his former state. Doubtless his recollection of the past had much of the nature of a dream. Doubtless the former experiences of the half-conscious race were transmitted to him with his blood. Doubtless the vicissitudes and the vivid impressions which time and circumstance had made on his unthinking but highly sensitive ancestry recurred in his own thought, and constituted a sort of basis on which all of his theories respecting his past history were built. As for the substance of these theories, that was gathered from the folklore of his tribe.

Tradition deals directly with the genesis of mankind.

Not deficient or inactive was the talk passion among primeval men. In this respect the various peoples differed greatly, some being comparatively taciturn, little disposed to communicate with their fellows, and others having a natural enthusiasm and gift in the commerce of speech. Some of the most intellectual and vigorous of the ancient races were loquacious to a degree that can not now be well appreciated. In such cases much of the reflective talk of the tribe took the form of traditional lore. The origin of man was the keynote of the oldtime story. The primitive peoples, especially those gifted with imagination and a highly developed language, were ever busy with the theory of the genesis of the race.

Work of the talk passion among the primitive races.

At the same time they took up the problem of nature outside of man. The forms, aspects, and phenomena of the material world demanded an explanation as well as man himself. Mythology, legend, and tradition were soon rife, and were infinitely inflected according to the fancy and fragments of information which the various tribes possessed. All agreed that *some* explanation must be given of the time, the place, and the circumstances of man's appearance on the earth. All were agreed that in some way he had come. None conjectured that his past existence was an eternity. Each had the concept of a previous condition in earth and heaven wherein man had no part or lot.

Nature, also, demanded an interpretation.

It thus happened that each race, according to its light, according to what it had received from older members of the tribe, according to its concepts of the methods and possibilities of the case, produced the story of man-life in the earth. The story was from one point of view as variable as the fancies of the race were vague and their creative powers capricious. But from another point of view there were common features in the traditions which now gained currency, and these common features at length constituted a sort of body of philosophy which was accepted with more or less reservation by the great minds of antiquity.

Primitive concepts were generalized into a philosophy.

From all this it must readily appear how great a part tradition has performed in establishing the beliefs of mankind with respect to the remote past. It might be said, even at this late day, that the whole intellectual structure of the world rests on the concrete of tradition. He who therefore would investigate for himself and for others the primitive state of man—would in particular inquire into the probable time and conditions under which men began to be among the living creatures of our globe—must carefully consider the traditions which the races of men have formed with respect to themselves.

Beliefs of mankind derived in large measure from tradition.

LANDSCAPE OF THE BEGINNING.—Drawn by Riou.

Here, then, true history begins. As it was the first, so also it seems to be the last and greatest of the products of the human mind. As it was the earliest endeavor of the conscious race to express its concepts of itself, so also is it the

Office of history to solve all problems of man-life.

latest endeavor of that same race to explain, interpret, and elucidate the true course and character of human affairs in the earth. It goes with the saying that it is sooner or later the function of history to answer in a satisfactory manner the all-important questions which stand at the beginning of the present inquiry. In doing so the science—if science it may be called—draws within its compass all the results which have been reached in all the fields of human inquiry.

Supreme place of history in the realm of human inquiry.

Above all other branches of knowledge, history sits and broods, with wings outspread as though the universe of things were pregnant and must bring forth under the shadow and power of thought. It may be truthfully said that every other form of learning tends to this. True history is the generalized result of all things that have been thought and done by men. When complete, it must of course take cognizance not only of the genesis, but also of the final destiny of man. For the present it may be freely confessed that true historical inquiry has not extended very far into the past, and that it has still more feebly divined the future. Nor may the historian of this age with right reason hope greatly to extend the domain of this science of the sciences in either direction. He may, however, properly aspire to place in better light that part of human history which relates to the primal appearance of mankind on the earth, and to throw some pencils of reflected light on the time and circumstances of the beginning.

9. *Chronology.*—Out of history, and as a department thereof, has arisen chronology as a special branch of inquiry. It may be said to be at once a factor and a result of all historical investigation. With the ancients it meant properly the computation of time. With the general analysis and classification of the sciences it has come to be a consideration of the time-order of the successive events which have occurred in the history of the world. It is the function of chronology to determine, not only the particular dates at which the events of the past have happened, but the order of their succession and the intervals of time between them. It thus furnishes the framework of all things soever that have occurred in the human universe. There is a sense in which the whole structure of tradition and history rests upon the chronological foundation. Even the ancients who gave, sometimes in charming manner, the narrative of events, paying attention to the dramatic order—which is only the natural order of all things soever—and who were as a rule given to the neglect of dates, nevertheless showed considerable appreciation of the importance of chronology. The true science, however, is of modern origin; its exact phases belong to the last quarter of the eighteenth century, and more particularly to the closer investigations of the present age.

Chronology a branch of history; its proper function.

Chronology finds its possibility in the movements of the heavenly bodies. The primary facts are the rotation of the earth on its axis and its revolutions around the sun. The abstract concept of time is more difficult to grasp than might at first thought be easily apprehended. This is to say that in the absence of tangible phenomena, such as those produced by the movements of the spheres, it might be difficult to form a true notion of that abstract continuance or duration to which we give the name of time. But the revolution of our globe, and the resulting aspects of the heavenly

Foundation of chronology in the rotation of the planets.

bodies as viewed therefrom, divides duration into parts, and furnishes an easy calculus for time measurement.

Out of nature a scale may thus be constructed to which human affairs are adjustable, and in the light of which they are most easily comprehended. Chronology furnishes a sort of time *locus* for everything, and it is by the employment of such a scheme that the vast and orderly progress of human events is first discovered. All historical perspective depends upon the chronological relations of the objects of the human landscape. There is, first of all, a horizon. The remoter facts stand far back against the dim line which divides the known from the unknown. The size, appearance, and relative importance of such facts must be estimated by their distance from the observer. The objects of the nearer landscape, as judged by the senses, seem vast and tall. Without the aid of the chronological perspective the concept of the past would be utterly distorted and ludicrous.

Historical perspective depends on chronological order.

We have here reached one of the particular grounds of the inquiry constituting the theme of the present book, namely, the time of the beginning. If the scheme of human knowledge were perfected the inquiry would be simply chronological and nothing more. But the reader must bear in mind that the thing attempted is to *extend* the chronological lines into that obscure domain under whose mists and shadows the unconscious part of human history was transacted. For this reason all the preceding sciences to which we have referred are called into requisition, in this part or in that, in the hope of extending the scheme of chronology, not indeed with exactitude, but with some approximate certainty to the infancy and childhood of the human race.

If knowledge were complete chronology would end the inquiry.

CHAPTER II.—ASTRONOMICAL ARGUMENT RESPECTING THE ANTIQUITY OF MAN.

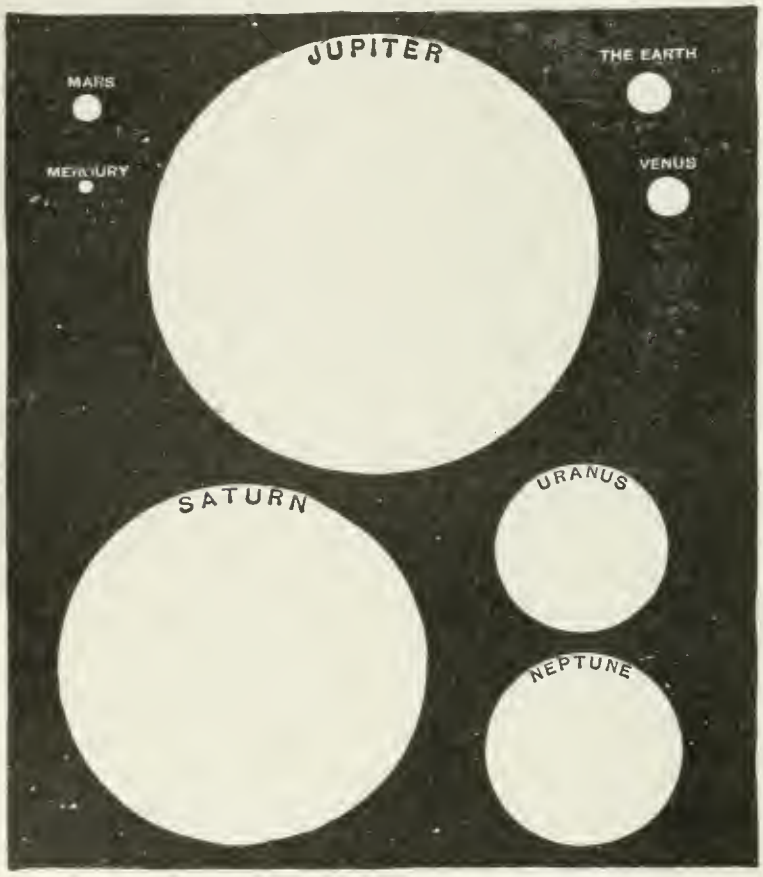
FROM what has been presented in the first chapter we may discover the general sources from which information and suggestion may be derived with respect to the antiquity of man. The various branches of science to which we have referred in the preceding pages are the *witnesses* which may be summoned to give testimony on the great question involved in this inquiry. It will be seen at a glance that, for the most part, such testimony is not direct. In some instances, particularly in archæology and geology, the evidence may be considered immediate and indubitable. But in most respects the scientific knowledge which we possess relative to the time, the place, and the circumstances under which the human race made its appearance on the Earth is indirect and only by reflection. It is as though a mirror were held aloft in the surface of which we may see the objects and movements below the horizon. He who studies the prehistoric career of mankind by the aid of the sciences to which we have referred, is as the observer who, sitting by the window of the flying car,

Science testifies indirectly to the time and order of life.

may see the moving spectra of distant landscapes appearing and disappearing among the shadows of the other side.

On the whole, those forms of human knowledge which we now possess, bearing on the question of the relations of world-life and man-life, are in analogy with the witnesses who observed our individual development through the unconscious stages of infancy. In some respects the evidence which we possess with regard to our own growth and conduct during the unconscious stage—with respect to the date and circumstances of our birth and the events with which the first years of our individual life were associated—is superior in quality, more satisfactory to the conditions of right reason, more conclusive as to the things in question, than is the evidence derived from the branches of knowledge referred to with respect to the time and conditions of the infancy and childhood of mankind. But in other respects the latter evidence is the better of the two. It is, on the whole, less colored, less perverted by the imperfections of merely human testimony, less affected with errors arising from what is called the personal equation, than is the purely oral tradition handed down by our fathers and ancestors with respect to the unconscious epoch in our individual lives or in the lives of themselves. We may, therefore, in a general way take our stand among the sciences above delineated, and interrogate them with some antecedent expectation of profit with regard to the place of the appearance of primeval man.

Authenticity of evidence for individual and race compared.



COMPARATIVE SIZE OF THE PLANETARY WORLDS.

If we take a critical survey of our solar system, occupying the astronomer's point of view, we find that system to be in various stages of development as it respects the great fact called life. We here plant ourselves upon the assumption that the phenomena of life are generally distributed through the visible universe. The discovery in our own age of the fundamental identity of the stellar and planetary materials furnishes

Probability of the diffusion of life throughout our system.

a solid basis for the inference of the accompanying distribution of life. It is clearly demonstrable that the small group of worlds with which our own globe is associated are fundamentally identical in structure. From the sun outward to the lone satellite of Neptune no considerable variation has been discovered from the established material unity of the whole group. There is, therefore, in the first place, no perceptible physical barrier to the dissemination of the common forms of life throughout our neighboring worlds. But a stronger ground even than this for the hypothesis of life in the planets is found in the conditions of right reason. That indeed must be a strangely constituted intelligence which can accept the theory of the limitation of life to our own earth. Such a supposition must rather provoke a smile on the countenance of every intelligent being who has risen to anything like an adequate conception of the scale and character of the material universe. To suppose that a single insignificant orb like our own, scarcely discoverable in the multitude of worlds and systems, should be the favored spot in which life and intelligence are manifested, while all the rest of the stupendous universe round about is, as it were, a mere waste of material structure, is to entertain a concept of nature utterly absurd. Such a view is the very essence of that natural, but irrational, anthropomorphic notion of the universe, the existence of which in the mind of antiquity we can well understand, but the perpetuation of which in the era of light and knowledge seems at once unaccountable and preposterous.

The fact of life constitutes, then, the only rational explanation of the existence of the material universe. On any hypothesis material nature can hardly be said to exist for itself. A system of worlds like our own has no rational explanation except that which is found in the suggestion of an arena of life, and finally of intelligent activity. Let him who will attempt to frame any other explanation of the existence of worlds, any other intelligent or even conceivable purpose for which things are designed or for which they merely exist, and he shall soon find the futility of the effort. Material nature has its *ratio ultima* in the basis which it furnishes for the display of vital phenomena, including intelligence as the highest expression of living force.

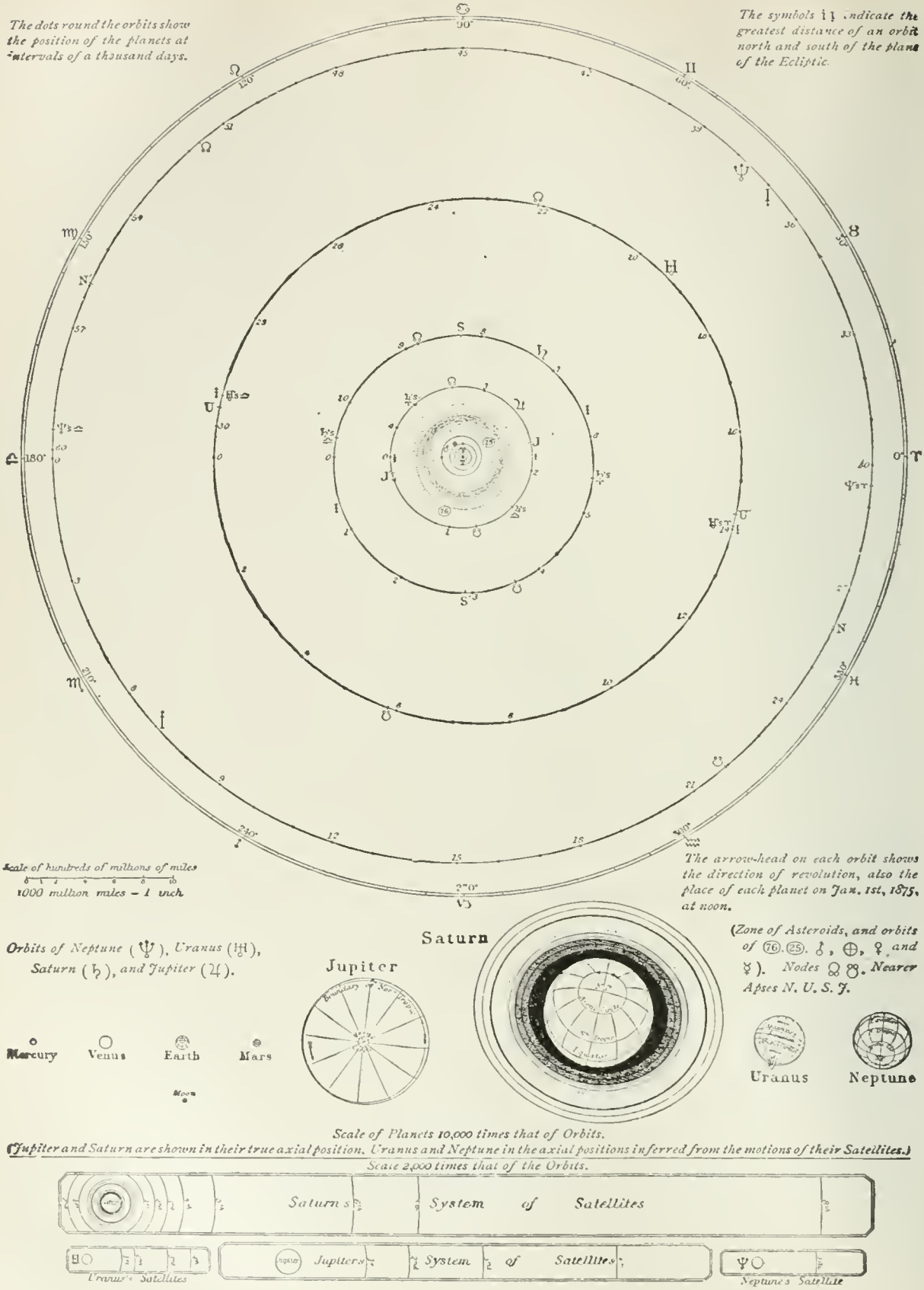
Life and intelligence the explanation of material nature

It is freely admitted that direct scientific demonstration of the existence of life and intelligence in any world other than our own is not possible in the present condition of human knowledge. It may not be possible for ages to come, or ever possible to the end of our own world-life and the final scene of the present state. One of the elements, however, of all our best attainment is the use of right reason and the ready acceptance of the results to which it leads. We may not admit that the universe is an absurdity. We may not any longer suppose that our own small earth with its burden of interests, to us so overwhelming, is of any superior consequence in the universal scheme beyond what the size, place, and physical importance of our little globe may reasonably imply.

Reason must aid in determining the purpose of the universe.

We are thus to consider the system of worlds with which our own is associated as a common system, having common features, obeying common laws, subject to common vicissitudes, and determined by a common destiny. The planets that traverse the adjacent spaces are even as

General view of planetary system; its common features.



SOLAR SYSTEM—SHOWING RELATIONS OF ORBITS, COMPARISIONS OF PLANETS. AND PLACE OF THE EARTH.

Drawn by Richard A. Proctor. F. R. A. S

our own. Some are smaller and some are almost infinitely greater, but all are virtually identical in structure, characteristics, and final purpose. But the worlds above and around us are, nevertheless, greatly discriminated from our own with respect to the stage of development in which they are respectively found. Some are old and some are young as compared with our planet. Some are, doubtless, at the present time in a process of evolution and development almost identical with that through which our own globe passed in geological ages far agone. Others have gone forward more rapidly than the earth, and have reached the condition toward which our planet is slowly, steadily, but surely tending, and at which it must at length arrive under the force of universal laws.

Not only do the worlds differ among themselves with respect to their age, considered as planetary bodies, but they also differ in another ratio with respect to their age relative to the epoch of life. The antiquity of a planet, considered as a planet, does not determine its relation to life and its conditions. This is to say that the process of evolution may go on so slowly in some of the older worlds that they reach the epoch of life at a period much later in world history than do some other planets in which the process of world formation goes on more rapidly. In a general way it may be scientifically alleged that the smaller globes, having once assumed the planetary form and condition, sweep on more rapidly toward the epoch of life than do the larger, in which the development in the planetary sense is slow and long-postponed.

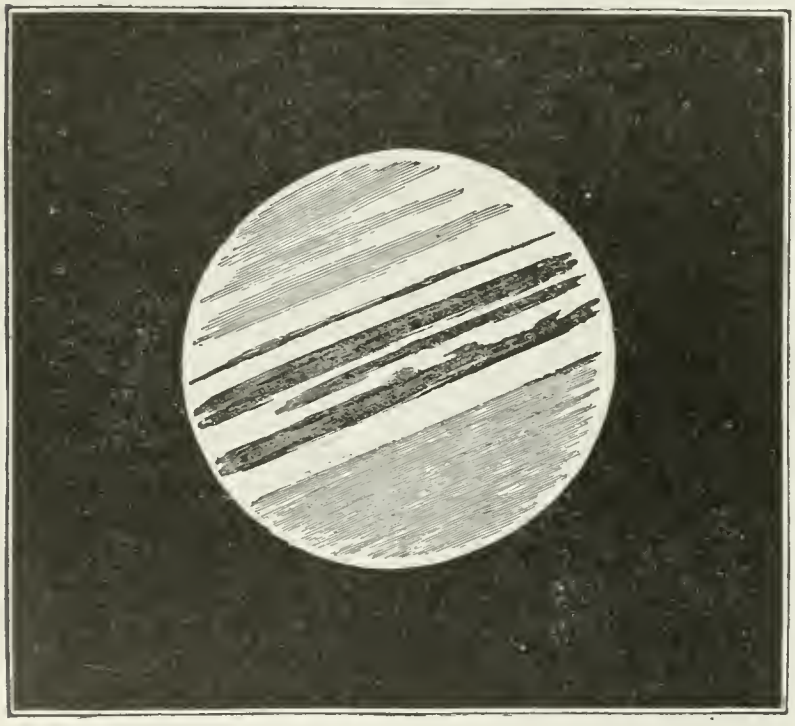
Relations of world age to the epoch of life.

The New Astronomy has now assigned to each of the worlds of our system its approximate place in the scheme of development. It would appear that as to mere planetary genesis the great worlds Jupiter and Saturn are the eldest-born of the system; but so far as the epoch of life is concerned, those mighty worlds are the youngest of all. The planets most advanced in age as it respects the correlated phenomena of life, are the earth and Mars, between which many analogies are discoverable. Of the two the earth is, doubtless, considerably older than the other, as world-age is measured by the manifestations of life thereon. This is to say that the earth and Mars gave off their excessive heat and were cooled sufficiently to admit of vegetable and animal life at an age far earlier than in the case of any of the other planets. Drawing our analogies from the forms of life with which we are familiar, it is quite certain that Jupiter

Science determines the relative ages of the planets.

POSITION OF THE PLANETS INFERIOR TO JUPITER—SHOWING THE ZONE OF THE ASTEROIDS.

and Saturn have not yet reached the life-bearing epoch. That they will at length reach a stage of worldhood at which animate beings can exist upon their surface and in their waters can not be doubted. As little can it be doubted that in course of time the earth and Mars will lose the conditions under which life can be perpetuated. In that event we may be sure that the epoch of life will cease in our own planet, though the earth, as such, may continue to occupy its place indefinitely in the solar system.



JUPITER—A PLANET NOT YET ARRIVED AT THE EPOCH OF LIFE.

The thing to be granted from the consideration of these facts is that all worlds have a planet life, and that, in connection with this planet life, at a certain stage thereof life proper becomes tolerable in the given sphere. With this event the Epoch of Life begins and runs parallel with the history of the given world until the conditions of the latter are so changed as to prevent the further propagation or existence of life upon it. After that, as in the probable case of our secondary, the Moon, the given orb becomes a dead world, though still obeying the physical laws under which its place and motions have been hitherto determined.

Epoch of Life is adjusted to certain stages of planet life.

Let us, then, briefly consider what we may call the astronomical preparation of the earth for the appearance of man-life upon it. By what process of world-evolution was it brought into the state of habitability? For we may be certain that the fact of habitability and the first appearance of man were coïncident circumstances. The preparation of our globe for the human race had respect primarily to the condition of heat. This is to say that a heat equation had to be established on an astronomical basis; and by considering the astronomical conditions antecedent to the appearance of man-life, and by knowing the rate of change which the world has undergone in its planetary relations, we may arrive at an approximate date for the beginning of the human race.

Preparation of the earth for habitability; the heat equation.

The equation of heat to which we have just referred has for its principal, though not its only, element a certain vibration, or oscillation, which has been going on in the orbit of the earth from the time when that body, loosened from

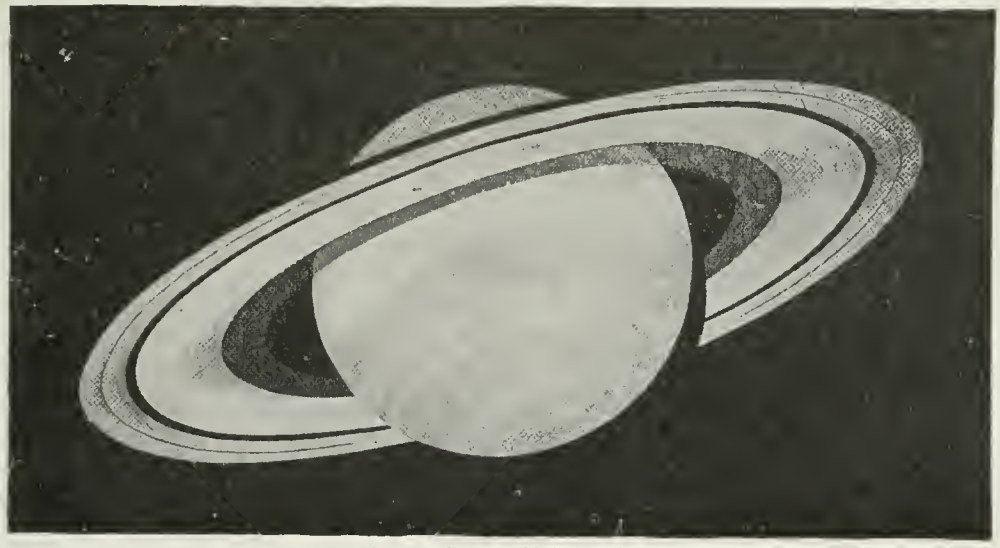
the common nebulous mass, began to be evolved into worldhood, and which will continue to the end of our planetary career. We must here refer to many astronomical facts which are familiar as facts, but of which the significance has in some measure been overlooked. The orbit of the earth is an ellipse, having the Sun in one of the foci; but the elements of the ellipse are not constant. On the contrary, the two axes of our orbit lying at right angles to each other are inconstant or variable quantities. A change is ever going on by which the ratio between the major axis and the minor axis is affected.

Vibrations of the earth's orbit as affecting distribution of heat.

The character of the earth's orbit is thereby constantly modified. At first it approximates the circle, and then recedes from the circle until it reaches a maximum elongation. This elongation, or departure from the circle, is called the eccentricity of the orbit. Having reached the maximum of this eccentricity, the major axis begins to contract and the orbit to expand laterally, until after a great lapse of time the circle is again approached, but never quite attained. The elongation of the minor axis, with the consequent expansion of the orbit, ceases, and the major axis once more begins to project like a lengthening arrow into space.

Nature of the fluctuation in our orbital axes.

These changes in the two axes of the orbit, with the consequent fluctuation toward and away from the circle, continue at immense intervals, and will continue as long as the present system of world order endures. Under the force of the precession of the equinoxes, the position of the two axes, always at right angles to each other, constantly changes. They point to different parts of the surrounding heavens, each of them contracting and expanding within fixed limits which are determinative of the character and stability of our orbit.



SATURN—A RING PLANET.

It is assumed that the reader is familiar with such terms as aphelion and perihelion, that he has a clear concept of our planetary orbit, of the plane of the ecliptic, of the equator of the earth and the heavens, of the inclination of the earth's axis to the plane in which our globe makes its journey around the sun,

Assumption of knowledge of astronomical phenomena.

and of the circumstance of a summer and winter solstice, a vernal and autumnal equinox, and of the precession of the equinoxes. It is also assumed that he apprehends the nature of the solar illumination of an ever-changing hemisphere of the earth's surface, of the altered and altering position of the sun as viewed from any given point on our planet, and

THE MOON—AN EXPIRED PLANET.

of the attendant phenomena of the seasons. Presumably he is able to apprehend that these phenomena go back for their causes to the inclination of the axis of the earth to the plane of its orbit, and to the eccentricity of that orbit; that is, its deviation from the circle.

It may not be known, however, that the phase of our orbital career through which we are now passing is that of contraction, or approach to the circle. The major axis of the earth's orbit is diminishing, and the minor axis increasing in measurement. The eccentricity of the orbit is slowly but surely diminishing toward zero. This signifies that the difference between the perihelion, or nearest approach of the earth to the sun, and its aphelion, or greatest distance, is becoming less and less with each revolution. The process will continue until the difference shall be reduced to a minimum; but immediately thereafter the reversal of conditions cause the major axis to elongate and the minor to shorten, and will throw the aphelion and perihelion of the orbit into positions different from those which they now occupy in space.

Present phase of the planetary oscillation.

Modern astronomy has made very careful and critical estimates of all these variations, and more recently has ventured to apply to them the measurement of time. The eccentricity of the earth's orbit was determined with tolerable accuracy as early as the time of Leverrier; but since the days of that astronomer the calculations have been perfected, and the elements of our orbit more accurately determined. According to these tables, the highest

Limits of eccentricity in the earth's orbit.

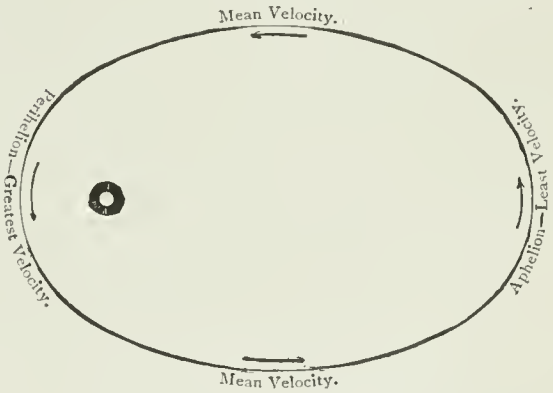
eccentricity ever attained by our orbit was, decimally expressed, 0.0747. The minimum eccentricity is about 0.0102. Between these two extremes the orbit oscillates with ever-changing conditions of climatic phenomena.

Perihelion and aphelion determinative of heat.

We may here discover the fundamentals of that equation of heat to which we have referred. It is well known that in the present condition of our orbit, the earth, in its annual revolution, approaches and recedes from the sun, thus fixing a point of nearest approach called the perihelion, and another point of greatest distance called the aphelion. At the present time the difference in the distances of the earth from the sun at these two crises in the annual revolution is, in round numbers, three million miles—a distance sufficient, as we shall see, to make a very perceptible difference in the heat conditions of the earth. It must be noted with care that our perihelion lies near to the winter solstice, and that our aphelion approximates the summer solstice. This is to say that when, owing to the inclination of the earth's axis to the plane of the ecliptic, the sun has receded far to the south in midwinter—when the days thereby have been reduced to a minimum for the northern hemisphere and the nights lengthened to a maximum—we are about three million miles nearer to the sun than we are in midsummer, when he has come by gradual approaches northward across the tropic and looks down almost vertically upon the temperate zone.

Conditions on which amount of the sun heat received depends.

The amount of sun heat received on the surface of our earth depends upon two simple conditions: the angularity of the rays as they enter our atmosphere; and, secondly, the distance from the solar luminary. The more directly the rays fall upon the earth, the greater the heat; the more obliquely, the less the heat. The nearer the approach of the earth to the sun, the greater the heat: this, being in a ratio inversely as the square of the distance between the two globes. We are thus in the northern hemisphere (fortunately we may say) brought into perceptible nearness to the solar luminary in midwinter, while in summer we are remote. This is to say that in all our parts of the earth the cold of winter is abated, as is also the heat of the summer, by the circumstance that the perihelion and aphelion of our globe



VARYING VELOCITY OF PLANETARY MOTION.

fall respectively in the seasons mentioned. If the conditions were reversed, so that our aphelion should fall in midwinter and our perihelion in midsummer, it is easy to see how greatly the seasons would be intensified. Instead of being tempered, as they are at present, by the relations of the earth and sun, the cold of winter would be aggravated by the removal of that luminary to a greater distance in space, and on the other hand the heat conditions of summer would be intensified.

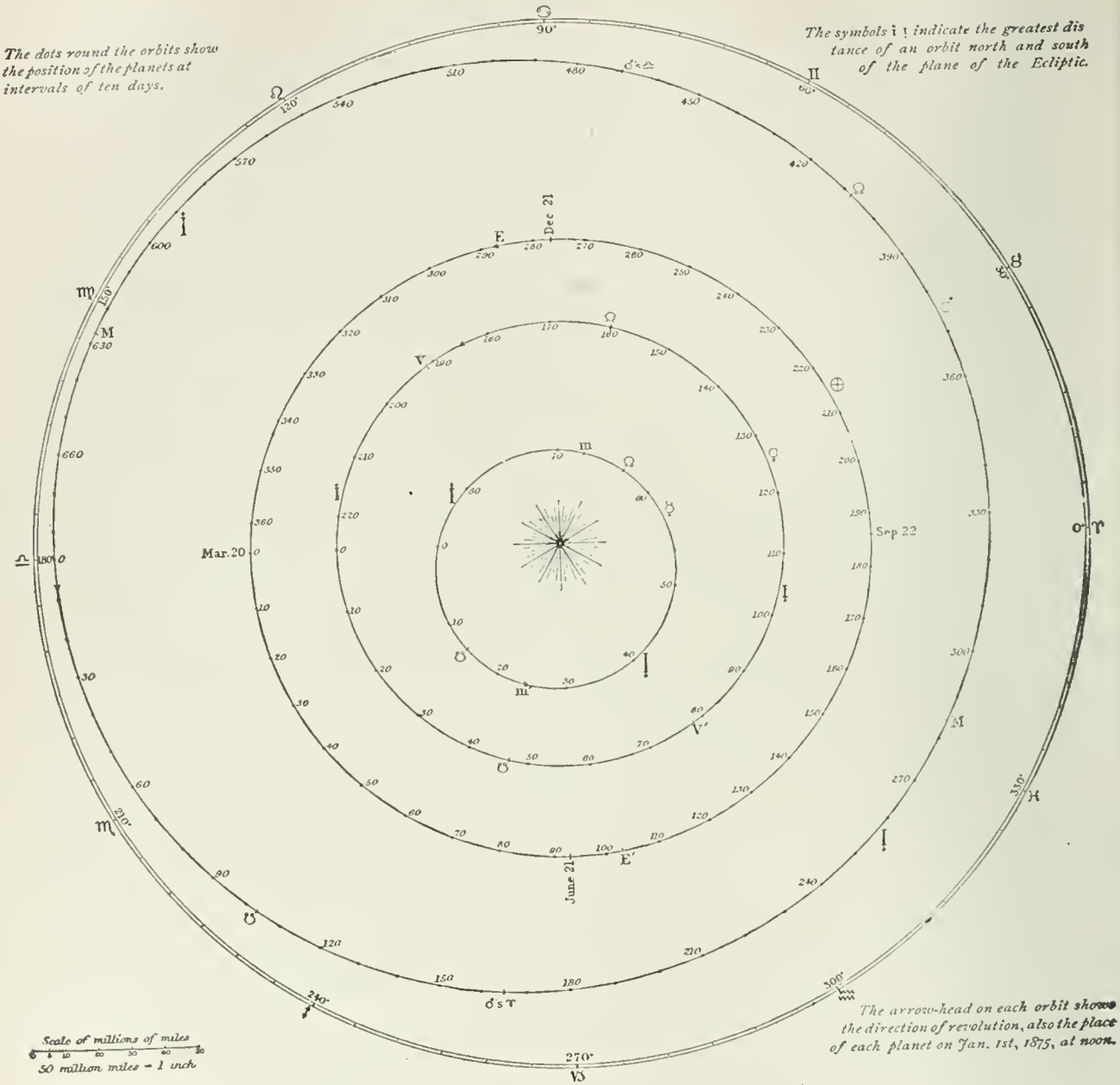
Astronomers have estimated with care the variation in climate produced by the circumstances here referred to. It has been demonstrated that the cold of winter in the northern hemisphere is

Orbits of Mars (♂), the Earth (⊕), Venus (♀), and Mercury (☿).

Nodes ☊ ☋. Nearer Apses M. E. V. m.

The dots round the orbits show the position of the planets at intervals of ten days.

The symbols ♀ ♀ indicate the greatest distance of an orbit north and south of the plane of the Ecliptic.



The arrow-head on each orbit shows the direction of revolution, also the place of each planet on Jan. 1st, 1875, at noon.

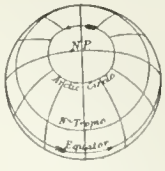
Scale of millions of miles

0 10 20 30 40 50

50 million miles = 1 inch

Mars

The Earth

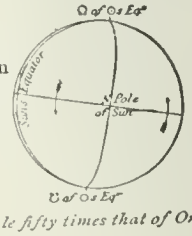


The Moon

Venus

Mercury

The Sun



Scale fifty times that of Orbits.

Scale five thousand times that of Orbits.

(The Earth, Mars, and the Sun are shown in their true axial position.)

THE SOLAR SYSTEM DISPLAYED—SHOWING ECCENTRICITY OF ORBITS INSIDE OF MARS

Drawn by Richard A. Proctor, F. R. A. S.

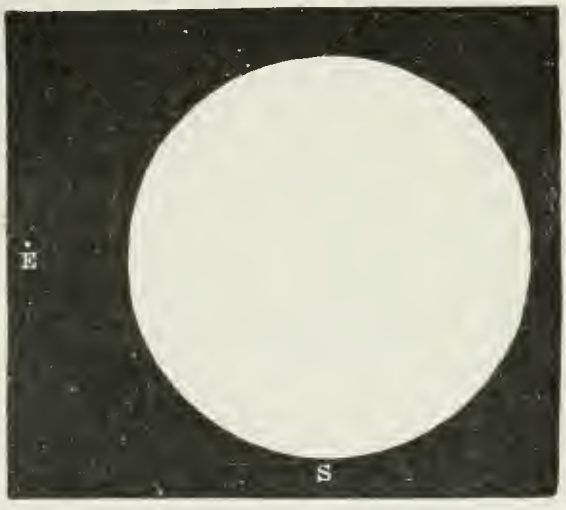
less severe by about one fifteenth than it would be if the relations of perihelion and aphelion were interchanged. In like manner the heats of our summer time are less torrid by one fifteenth than they would be if the earth were at its nearest approach to the sun at that season of the year. Or to take the problem altogether, the distribution of heat has been tempered and moderated in the northern hemisphere by an aggregate of about two fifteenths of the whole increment.

Favorable results of present position of perihelion and aphelion.

As has been said, there was a time in the astronomical past when, by the fluctuations of the earth's orbit above described, our planet was actually thrown into the unfavorable relation of a perihelion in summer and an aphelion in winter. It must be borne in mind, moreover, that the present eccentricity of the earth's orbit is greatly less than it was at the period of greatest elongation. At that date in the remote past the earth in perihelion approached within eighty-five million miles of the sun, and at its aphelion receded to a distance of more than ninety-nine million miles. This variation amounting to more than fourteen million miles, between the nearest approach and the farthest remove of our planet from the sun, would necessarily produce a corresponding difference in the amount of heat and light received in the two positions. This difference has been calculated to be for the period of greatest elongation about one fifth of the whole, or, to be more exact, as nineteen is to twenty-six. Since, at the present time, by the reduced eccentricity of our orbit, the difference in the sun's influence upon us by his approach and recession from the earth has been reduced to one fifteenth, we are able by comparison to appreciate the vast difference between our present climatic fluctuations and those which prevailed at the period of greatest eccentricity.

Former unfavorable astronomical position of our planet.

We are here noting the condition of affairs in the northern hemisphere. It is from this point of view that all the phenomena of man-life on the globe are



COMPARATIVE SIZE OF EARTH AND SUN.

to be considered. At that period in the remote past when our orbit was extended to its greatest elongation, the earth being in aphelion at the winter solstice, the cold was increased to a very marked degree over that which now prevails at the corresponding season of the year. It was a time when the conditions of all kinds of life in our hemisphere were very unfavorable. At that time in the history of our globe the major axis of the earth's orbit was greatly extended and the minor was correspondingly shortened. This would throw the elongation of the orbit in the opposite direction to that which it now occupies. The result would be that during that period of our planetary career the earth would suffer a great depression of temperature while passing through its

Antecedent conditions of glacial epoch in northern hemisphere.

annual aphelion. Thus the cold throughout the northern hemisphere, which is still sufficient to produce and maintain great areas of ice, would be much intensified, and although the heat of the shortened summer would for the time be greater than at present, it could not prevail against the glacial condition which would obtain in all the northern parts of the earth.[1] In the southern hemisphere the case would be different. There the short and intense winter could not prevail against the long-continued high heats of summer, and the ice world would melt down and flow into the sea.

The two hemispheres with respect to development of man-life.

We are able in a measure to judge of what has been in the past, under these general laws, by a present survey of the condition of our climate. The northern hemisphere is the principal abode of man. It is tempered and modified as if in adaptation to man-life and the varied activities in which that life expresses itself on the surface of the earth. But in the southern hemisphere the case is reversed. There the ice mountain around the pole spreads far and wide as an everlasting desolation. Life is kept at bay not only by the absence of land in the antarctic continent, but rather by the excessive rigors of perpetual winter. The favorable one fifteenth of moderating heat which we receive in winter works in the southern hemisphere by contraries. So that, on the whole, the conditions of life—the astronomical conditions—in the north temperate zone are at present more favorable by two fifteenths than they are in the antarctic continents—if such there were.

Winter aphelion with axial elongation produces polar ice caps.

The reader may now retrace the course of our globe to the time when the greatest elongation of the earth's orbit was coïncident with winter; when the ice mountain surrounded the northern instead of the southern pole of the earth; when the vast fields of ice extending from the north pole southward in all directions covered the earth as if with a shining husk far down into what is now the temperate zone. At the same time he will perceive at that remote period the freedom and openness of the south polar region; because at that epoch the earth was in perihelion in summer and aphelion in winter; that is, as measured by an imaginary calendar for the northern hemisphere. Possibly at that epoch the antarctic continents were exposed, while many parts of the islands and shores of the northern hemisphere would be submerged under the overwhelming waters. It is easy, in a word, to recognize, in the conditions here established from the standpoint of astronomy, the existence and the causes of that wonderful epoch in world history to which geology gives the name of the Glacial Period. That period had its origin in the axial fluctuations of the earth's orbit. The

[1] During the perihelion of a planet, its motion in the orbit is greatly accelerated, and as a result the season of perihelion, whatever that may be, is shortened. On the contrary, the motion of a planet in aphelion is retarded, and the season lengthened in proportion. When the perihelion falls in winter, as it does in the case of our world at the present time, the season of rigor is abbreviated by the increased velocity of the planet. On the other hand, our summer is protracted by the slow movement of our globe during the period of aphelion in June and July. With the reversal of these conditions the winter would be not only intensified by the greater distance of the sun, but also prolonged by the retarded movement of the earth, and vice versa the summer, though intensified by the nearer approach of the sun, would be quickly over by the rapid motion of the planet in that part of its orbit. The aggregate effect would be to give us in the northern hemisphere a climate more severe as to the phenomena of cold by an increment of about two fifths—a change sufficient to produce the north polar ice-cap of the glacial period.—See diagram, p. 63.

northern hemisphere became the hemisphere of ice at the epoch when the major axis of the earth's orbit lay transversely to the position which it now occupies, and at the time when the greatest elongation of the orbit was attained. The result was that our globe, our northern globe, would be in aphelion in winter and perihelion in summer, and the effect of this would be the intensification of the seasons, resulting in the heaping up around the north pole of a prodigious ice mountain, extending down in all directions like a cap over the northern hemisphere, until its southern edges would be melted away by the solar heat.

We have thus established the primordial conditions of the glacial period in geology. We are able to see clearly how it was that from astronomical causes the larger part of the northern hemisphere was formerly enveloped with heavy masses of ice and snow. We may also perceive with equal distinctness the operation of the causes which would bring this period of desolation—certainly anterior to the appearance of man-life on the earth—to an end. These causes existed fundamentally in the fluctuations of the earth's orbit. The climax of the glacial period would be theoretically coincident with the greatest elongation of the earth's orbit at a time when, owing to the relative position of the major and minor axes, the aphelion of the planet would fall in winter. This is the key to the whole argument. This astronomical condition was the efficient cause of the creation of the ice mountain and envelop extending from the north pole far southward in all directions toward the equator. Practically, however, the crisis of this era of maximum rigor in our world history would fall *somewhat beyond* the time when the greatest elongation of the orbit was attained coïncidently with the falling of the aphelion in midwinter. Just as the crisis of our present winter is carried by climatic conditions considerably beyond the winter solstice and thrown perhaps to the middle of January, so the crisis of the glacial period was carried by the astronomical conditions above described considerably *beyond* what may be called the midwinter of our world-life and thrown into our planetary January.

Fixing the place of our planetary January.

None the less, for practical purposes, we may consider the glacial period, or our world winter, to have been coïncident with the time when the earth was in aphelion at the winter solstice and when the orbit had attained its greatest transverse elongation. From that time forth the epoch of moderation began to ensue. The major axis of the orbit began to contract, the minor to expand. The aphelion began to depart from the winter solstice, and as a consequence the sun with each cycle occupied a more favorable and favoring position with respect to the ice cap which covered the northern hemisphere. Gradually and with long lapses of time the lower parts, that is, the southern parts, or spurs, of the ice mountain began to melt away. Sometimes great masses, inconceivably huge in dimensions, were broken off, as we now see in smaller example in the breaking away of the feet of the Alpine avalanches. More and more the favoring conditions came into existence, and more and more the sun's heat carried away and poured down into ever-swelling rivers the southern edges of the glacial deposits.

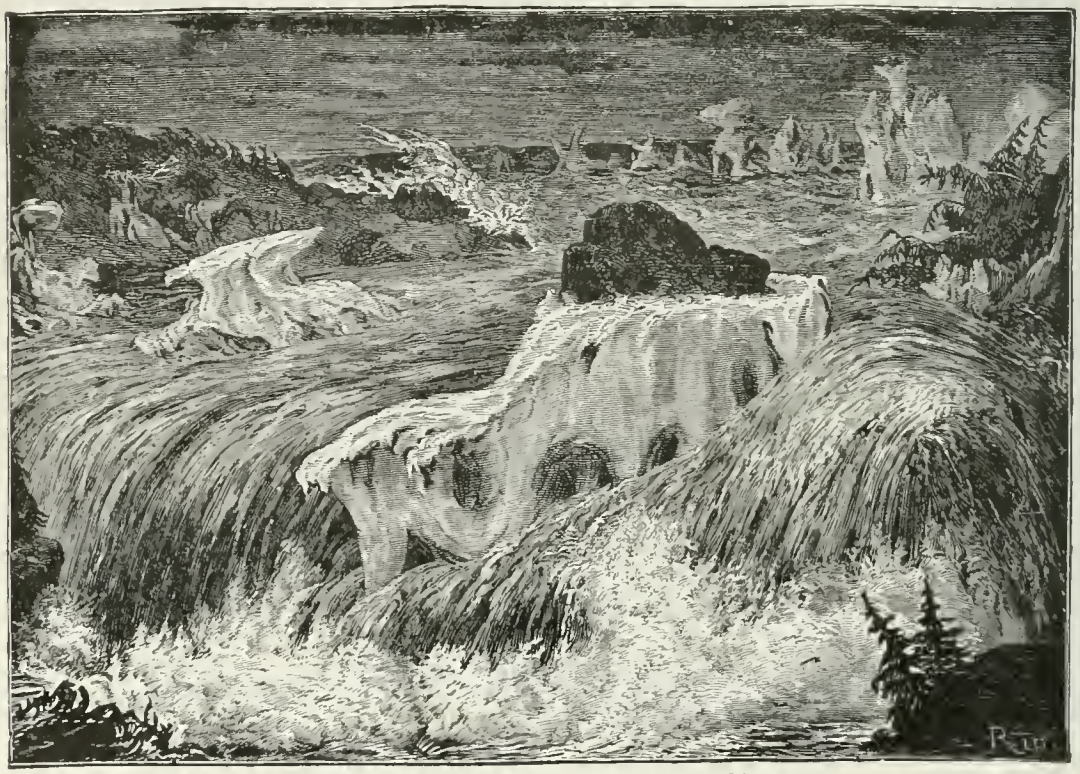
Epoch of moderation begins; formation of glacial rivers.

We have here the beginnings of our present world order. It was at this time that the general form and physical features of the different countries of the

northern hemisphere were determined. Now it was, as time rolled on and as the glacial period came to a close, that the great valleys were formed and defined in the bottoms of which to the present day the descendent streams of the ancient flood-rivers creep along on their way to the seas. In all the continents and countries of the northern hemisphere it is notable that the river valleys are out of all proportion larger than the streams of water which they have respectively borne at any time within the historical period. An examination of these valleys will show, moreover, unmistakably that they were once occupied with vast rolling rivers, extending from hill to hill, many times miles in width, and bearing downward under pressure of the prodigious floods all manner of flotsam and jetsam from the previous geological age, mixed with the detritus rubbed or scoured from the earth's surface by the crushing and plunging plowshares of the glaciers.

The circumstances and conditions here referred to are a part of geological inquiry; but the reader will have observed that the line of definition between astronomical antecedents and geological effects is quite difficult to draw. What we are here to consider is this, that the appearance of man on the earth is a fact lying *this side of the glacial epoch*. The present state of inquiry points distinctly to the era of the subsidence of the glacial rivers—that is, the great volumes of water produced by the melting away of the ice cap of the northern hemisphere—into the channels, still large and swollen, but approximately the same which are now occupied by the great streams of our continents, as the *time* when man-life began on the surface of our planet.

Man-life begins on this side of the glacial floods.



FORMATION OF GLACIAL RIVER.—Drawn by Riou.

It is not needed, in this connection, to enumerate the evidences by which the appearance of the human race on the earth is associated with the period of the subsidence of the glacial floods. These evidences will hereafter be presented when we come to consider the geological testimony bearing on the question of the antiquity of man. The particular inquiry with which we are here concerned is to find, if we may, a measurement of years, and adjust the scale to the changing planetary conditions which we have above described, determining thereby, with some fair approximation, the *date* of that epoch which may be taken as the maximum for the appearance of man on the earth.

Allowance to be made for inexactitude in vast calculations.

It were unreasonable in the last degree to expect exactitude in such an inquiry. In considering astronomical epochs and geological ages the small calendars devised by man for days and seasons are lost in the vastness. We must content ourselves to consider large numbers as units. In attempting to measure planetary changes the thousand or the million must be taken for one. Employing such large measurement, much incidental and minor inaccuracy must fall in the result, to be eliminated by the further application of science to the problems of nature.

Attempts to fix time data for the appearance of man.

Fortunately, physical science is now in such a stage of proficiency and advancement as to enable us to complete the study with a tolerable approach to accuracy. Since the times of the younger Herschel inquiry has been steadily progressing with respect to the fluctuations of the earth's orbit and the changing climatic conditions dependent thereon. After Herschel the study was taken up by Arago, Humboldt, and other geologists belonging to the first half of the present century. More recently, and within the eighth decade, the distinguished Dr. James Croll has carried forward the investigation with greater success than any or all of his predecessors. In the following table, prepared by Dr. Croll, we have a calendar of more than a million of years arranged in periods of ten thousand years each, from the maximum of 1,100,000 B. C. down to the middle of the present century. This part of the table occupies the first column; the second column is made up of the decimals expressing the eccentricity of the earth's orbit for each corresponding period in column one; the third column contains, in degrees and minutes, the longitude of perihelion for the successive periods; the fourth gives the difference of distance of the earth in perihelion and aphelion measured in millions of miles; and the fifth the excess of winter days over summer days for the corresponding periods.

Maxima and minima of the fluctuations in our orbit.

It will be noted that from several circumstances with which the astronomer is familiar the decimals expressing the eccentricity do not increase and diminish with perfect regularity, and the same is true of the degree marks expressing the longitude of perihelion. But the reader will not fail to note that *in a general way* the figures in all the columns rise and fall according to a definite law. He will note, for instance, that the lowest decimal of eccentricity given anywhere is 0.0102, and that the highest of all is 0.0747. He will also observe that the lowest measurement of the longitude of perihelion is 4° 8′, the highest being 358° 2′. In the third place, it will be noted that a relation, not perfectly constant, but nevertheless clear and unmis-

takable, exists between the maxima and the minima in the several columns under consideration. The table is as follows, the periods of greatest elongation being set in antique figures:

From the accompanying table we may note with ease the periods when the earth's orbit in the past has attained its greatest elongations. The first of these corresponds in round numbers with the

CROLL'S TABLES OF PLANETARY FLUCTUATIONS.

Year B. C.	Eccentricity of earth's orbit.	Longitude of Perihelion.	Difference of distance in millions of miles.	Number of winter days in excess.	Year B. C.	Eccentricity of earth's orbit.	Longitude of Perihelion.	Difference of distance in millions of miles.	Number of winter days in excess.
		Deg. Min.					Deg. Min.		
1,100,000	0.0303	54 12	....	....	550,000	0.0166	251 50	3	8
1,050,000	0.0326	4 8	....	....	**500,000**	**0.0388**	**192 56**	**7**	**18.8**
1,000,000	0.0151	248 22	2.75	7.3	450,000	0.0308	356 52	5.5	15
990,000	0.0224	313 50	....	....	400,000	0.0170	290 7	3	8.2
980,000	0.0329	358 2	....	....	350,000	0.0195	182 50	3.5	9.5
970,000	0.0441	32 40	....	....	**300,000**	**0.0424**	**23 29**	**7.75**	**20.6**
960,000	0.0491	66 49	....	....	250,000	0.0258	59 39	4.5	12.5
950,000	**0.0517**	**97 51**	**9.25**	**25.1**	240,000	0.0374	74 58	....	....
940,000	0.0495	127 42	....	....	230,000	0.0477	102 49	....	....
930,000	0.0423	156 11	....	....	220,000	0.0497	124 33	....	....
920,000	0.0305	181 40	....	....	**210,000**	**0.0575**	**144 55**	**10.5**	**27.8**
910,000	0.0156	194 15	....	....	200,000	0.0569	168 18	10.25	27.7
900,000	0.0102	135 2	1.25	4.9	190,000	0.0532	190 4	....	....
890,000	0.0285	127 1	....	....	180,000	0.0476	209 22	....	....
880,000	0.0456	152 33	....	....	170,000	0.0437	228 7	....	....
870,000	0.0607	180 23	....	....	160,000	0.0364	236 38	....	....
860,000	0.0708	209 41	....	....	150,000	0.0332	242 56	6	16.1
850,000	**0.0747**	**239 28**	**13.2**	**36.4**	140,000	0.0346	246 29	....	....
840,000	0.0698	269 14	....	....	130,000	0.0384	259 34	....	....
830,000	0.0623	298 28	....	....	120,000	0.0431	274 47	....	....
820,000	0.0476	326 4	....	....	110,000	0.0460	293 48	....	....
810,000	0.0296	348 30	....	....	**100,000**	**0.0473**	**316 18**	**8.5**	**23**
800,000	0.0132	343 49	2.25	6.4	90,000	0.0452	340 2	....	....
790,000	0.0171	293 19	....	....	80,000	0.0398	4 13	....	....
780,000	0.0325	303 37	....	....	70,000	0.0316	27 22	....	....
770,000	0.0455	328 38	....	....	60,000	0.0218	48 8	....	....
760,000	0.0540	357 12	....	....	50,000	0.0131	50 3	2.25	6.3
750,000	**0.0575**	**27 18**	**10.5**	**27.8**	40,000	0.0109	28 36	....	....
740,000	0.0561	58 30	....	....	30,000	0.0151	5 50	....	....
730,000	0.0507	90 55	....	....	20,000	0.0188	44 0	....	....
720,000	0.0422	125 14	....	....	10,000	0.0187	78 28	....	....
710,000	0.0307	177 26	....	....	0	0.0168	99 30	3	8.1
700,000	0.0220	208 13	4	10.2	Year A. D.				
650,000	0.0226	141 29	4	11					
600,000	**0.0417**	**32 34**	**7.5**	**20.3**	1850	0.0168	100 22	....	....

To these we may append Croll's special calculation for the maximum eccentricity between 851,000 B. C. and 849,000 B. C.

Year B. C.	Eccentricity of earth's orbit.	Longitude of Perihelion.	Difference of distance in millions of miles.	Number of winter days in excess.
851,000	0.07454	....	....	....
850,000	0.074664	....	....	....
849,500	0.07466	....	....	....
849,000	0.07456	....	....	....

year 950,000 B. C.; the next, with 850,000 B. C.; the third, with 750,000 B. C; the fourth reaches forward a little from the century mark thus far maintained to about 600,000 B. C. The next epoch is 500,000 B. C. It is clear from the table that the next lies between 350,000 and 300,000. The sixth corresponds with the year 210,000 B. C. The seventh and last falls approximately on

Periods of greatest elongation determined from Croll's tables.

the year 100,000 B. C. Or to generalize, we see that during the last million of years the fluctuations of our orbit from one period of greatest elongation to the next occupy approximately a span of a thousand centuries each. The movement is sufficiently regular to warrant us in accepting this period as the approximate unit of the oscillation.

Neglecting all the preceding epochs of greatest elongation down to the last, we note that the same corresponds approximately with the year 100,000 B. C. This may be taken as our critical date for the present inquiry. This epoch corresponds not only with the last period of our orbit's greatest elongation, but also with the time when the earth was in aphelion in winter. The date, therefore, marks the last crisis when our globe passed through what we have called above our planetary winter; that is, the crisis of greatest cold—the time when the conditions were all favorable for the production of the ice mountain around the north pole, and its extension in a glaring cap far down in all directions toward the equator. In was, in other words, the glacial period of geology.

Fixing of date of our last planetary winter.

As we have intimated, it is doubtless true that the crisis of the epoch of rigor lay further on somewhat; that is, this side of the date of 100,000 B. C. We might in a rough and conjectural way deduct five thousand or ten thousand years from the date of the crisis as an approximation to the date of greatest rigor. From that time onward there would begin to be an abatement of those conditions antecedent to the glacial accumulations; that is, the planet would begin to come into more favorable and favoring relations with the sun, and at length the preponderance of cosmic forces would balance the other way, and the glacial mass would begin, on its southern edges, to melt down into our northern oceans.

Crisis of rigor on hither side of period of elongation.

We thus arrive at length to the same condition which we have formerly described, namely, a condition of flood and river deluge in the northern hemisphere. In the present instance, however, we are working not abstractly, but with a scale of years determined by astronomical calculations. In other words, we see that somewhat less than a hundred thousand years ago the crisis of our glacial period was reached, and that subsequently, at a considerable span from that crisis, the ice mountains of the northern hemisphere began to give away under the returning conditions of heat. How long a period was required for these changed conditions to become operative in the liquefaction of the lower parts of the glaciers we are left somewhat to conjecture, but no doubt it required a considerable period for the returning approximation of the sun to begin to affect materially the glacial cap of the northern continents.

Epoch of the diluvial rivers in northern hemisphere

It may be assumed as a fact scientifically determined that the whole of man-life *lies this side* of the glacial period. Indeed, from what we know of the conditions present in the northern hemisphere during that period it would be impossible for the human race to maintain an existence upon the earth, even if the race had existed before. We are, therefore, to conclude that the being called Man made his appearance at a subsequent date, when the globe had been made habitable by the melting away of the glaciers, the subsidence of the rivers, and the definition of the continents in the forms which they now hold.

Era of man-life on this side of the diluvial age.

EXISTING ALPINE GLACIER.—Summit of Mont Blanc.—Drawn by Riou.

It would appear, therefore, that we might pass over at once from the work of astronomical laws to the geological conditions which ensued in and after the diluvian period, with a view to ascertaining more definitely at what time man and his works are first discoverable on the earth. This we shall presently attempt to do; but before passing to the geological inquiry respecting the antiquity of our race, it will be well to revert to one or two additional facts deducible from the laws of astronomy.

Place of the last thermal epoch for the earth.

One of these is that next to the last period of greatest elongation in the earth's orbit, falling as it did about a thousand centuries before the last, occurred under such conditions as to produce an epoch of heat in the northern hemisphere. That is, about the year 210,000 B. C., when the greatest elongation just referred to was attained, the sun was at or near perihelion in winter, the result being a great increment of heat in the northern hemisphere, with corresponding climatic and vital phenomena. This supposition we find to be confirmed by geological inquiry. It is evident, indeed well known, that a period of heat preceded the glacial epoch. There was a time anterior to the great accumulation of ice and snow in the northern hemisphere when almost tropical conditions prevailed throughout what is now our temperate zone and far up toward the polar regions.

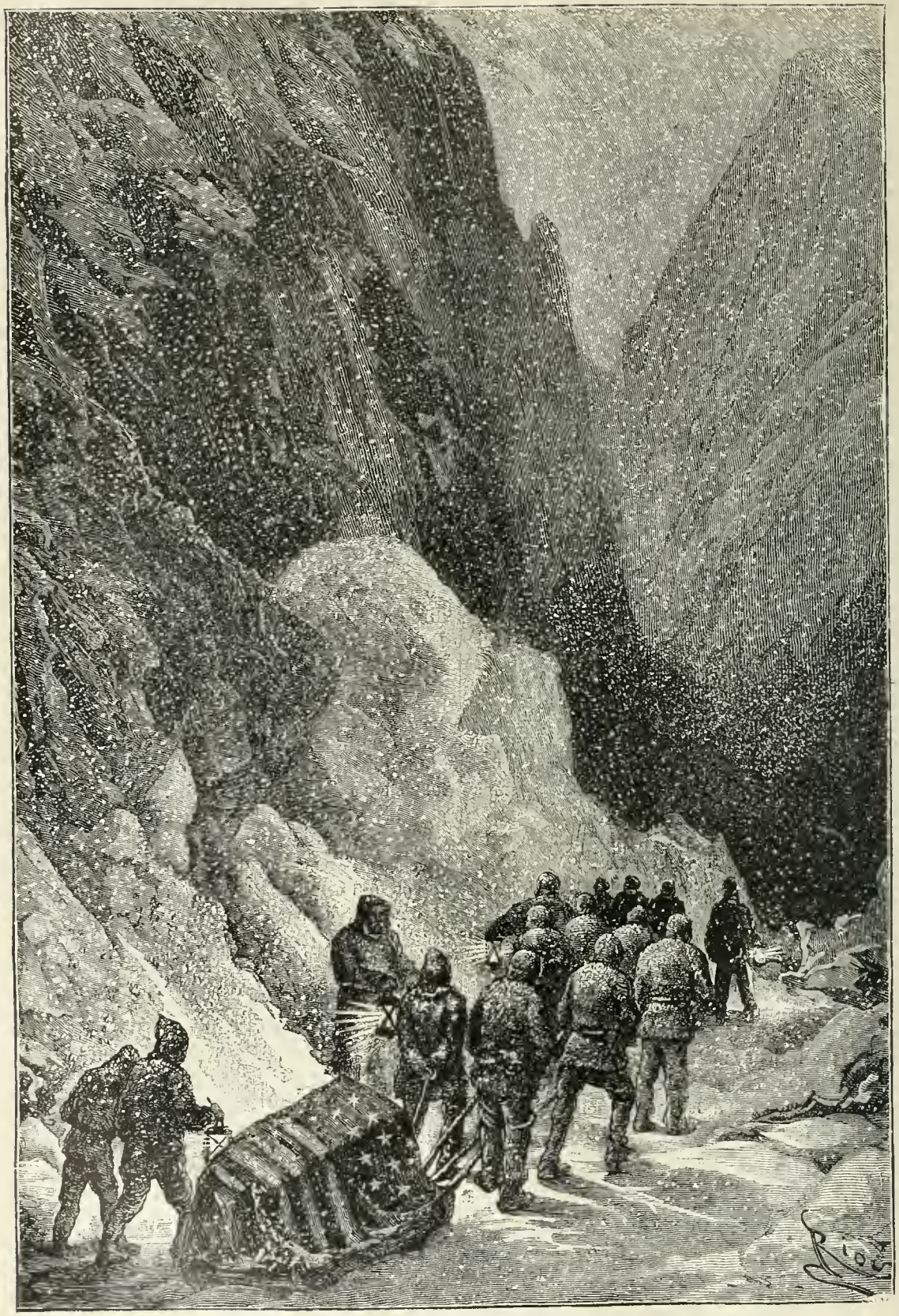
Relics of thermal age mingled with postglacial remains.

A thing of great importance to be observed in connection with this warm epoch is that the remains of animal and vegetable life which have survived therefrom, passing, so to speak, *under* the glacial epoch and reäppearing in the diluvian period, are so mixed and blended with the remains of animal and vegetable life belonging to the period *subsequent* to the prevalence of the glacial age, that the casual observer and student is likely to confound the two classes of relics as belonging to the same epoch. For instance, the specimens of woolly elephant which were caught, so to speak, by the glacial age, frozen up far to the north, and thus preserved to the diluvian period, may easily be referred by the uncritical inquirer to the same geological period which produced the mammoth, the reindeer, and the cave bear.

Depth of time perspective and remote date of man.

The significance of this circumstance is *the great depth of the perspective*, and the large allowance of time which must be made from the close of the diluvian period to the present. If the span between the preceding age of heat and the succeeding age of cold is, as it appears to be, measured by a thousand centuries—if the distance from the woolly elephant to the mammoth is so great—we may be sure that under the slow and regular processes of the natural world the distance from the close of the glacial epoch to the present time is almost equally immense. Without the ability to lay a measuring rod upon these vast spaces of time, and limited as we are to estimates, the mind is necessarily embarrassed with uncertainty; but the conditions of the inquiry, its metes and bounds being determined from scientific data, we are enabled to rest securely upon the general knowledge of the great duration of the astronomical and geological epochs which we are considering, and to accept with confidence a belief in *the remote date* of man's appearance on the globe.

A summary of the leading facts gathered in this inquiry may serve to bring before the reader with conciseness the data from which the deduction of the



CONDITION OF EXTREME COLD, ILLUSTRATED FROM ARCTIC LANDSCAPE.—Drawn by Rion

high antiquity of man is made. These data, reduced to their briefest expression, are about as follows:

Summary of deductions from astronomical laws and data.

1. The last period of greatest elongation of the earth's orbit fell about a thousand centuries before the Christian era.

2. This epoch of greatest eccentricity was coïncident with the aphelion of the earth in winter.

3. These two conditions acting together produced, so far as the climate of the northern hemisphere was concerned, an epoch of extreme cold, corresponding with that period in geology known as the glacial age.

4. The crisis of the glacial period lay somewhat *this side* in time of the coïncidence defined in paragraphs first and second of this summary.

5. Our planet ever since the crisis of the glacial age has, by favoring astronomical changes, been coming more and more into an epoch of climatic moderation suitable for the existence and activities of the human race.

6. The time at which the conditions in the northern hemisphere became sufficiently amended to admit and favor the appearance of man was coïncident with the epoch of the subsidence into their beds and proper channels of the glacial floods, produced by the melting down of the accumulations of the age of ice, as above described.

7. As an approximation to a measurement by time, it is safe to allow one fourth of the whole period, or two hundred and fifty centuries, for the period extending from the crisis of the glacial epoch to the time of the subsidence of the floods produced by the melting away of the mountains of accumulated ice and snow.

8. This would give us by approximation a maximum of seventy-five thousand years as the date at which the habitability of the northern hemisphere was sufficiently established to admit of the coming and preservation of man-life in our continents; but

9. The estimate just given must be taken as *a superior limit* beyond which astronomical, geological, archæological, and ethnical inquiry need not reach in expectation of finding the evidences or remains of human activity on our globe.

10. In cases where a maximum and minimum date are established as the limits within which an event has occurred, the principle of averages points to *the middle part* of the whole period considered as the safest and most certain approximation to the time sought for.

11. This would indicate that, from astronomical considerations and conditions determinative of the character and fluctuations of the earth's orbit, the probable epoch of the appearance of man on the globe was from thirty thousand to forty thousand years before the beginning of our era.

12. Such approximations and probabilities are, in the nature of the case, tentative, and are subject to modification and displacement by the result of inquiries bearing on the same subject, but conducted from the standpoint of other sciences.

If the foregoing study has clearly impressed the mind of the reader with any one fact, it is *the slow rate of change* by which our earth has passed, and is still passing, from stage to stage in its history. This is said not only of the planet considered as an orb in space, but of all its attendant phenomena and attributes of life and organization. Great, almost inconceivable, lapses of time are necessary to any appreciable change in the constitution, aspects, and vital conditions

Slow progress of world changes a fundamental concept.

of the world. The concept of this slow and orderly progress of planetary growth and development is as sublime as that which contemplates the magnitude and endlessness of the material universe. Certain it is that nature hurries not. Certain it is that her progress does not consist of catastrophes, phenomenal cataclysms, and astounding revivals. The rate of formation for our world, for all worlds, has been so gradual as almost to preclude the record of its growth by other than immortal or infinite beings. It is easy to refer the successive cycles of world history to the measurement of time by hundreds or thousands or millions of years; but a clear apprehension of the immense periods of duration necessary to the fact of worldhood is unattainable by the human mind with its present capacities and powers. The slow progress of world history and life history is, therefore, a fundamental concept in the work of determining the approximate time at which a rational form of being began its manifestations on our globe.

Still another consideration here suggested is the date—again approximate—at which we have now arrived in the epoch of life considered with respect to our world history. Are we but entering that epoch? Are we journeying on toward its middle? Are we in the after part of the stately progress? Or are we nearing its close? In what part of the History of Life, considered as a whole, do we find ourselves as a race of intelligent beings?

Question of our present place in the epoch of life.

It may be assumed that our race career on the earth is a long one. It stands to neither fact nor reason that the beginning and the end of human life on our globe lie near together. Everything that we know and observe points clearly to an extended, long-continued epoch for our race. As we have said, the scale of man-life is not as great as that of the planet-life. But so far as our globe has a *purpose*, that purpose has respect undoubtedly to the human beings that inhabit it; and we are at liberty to presuppose that the time during which our race holds and dominates the planet is far-reaching, both in the past and in the future. The conditions of reason are such as to lead us to believe that the period of our ethnic career extends almost infinitely in both directions.

Reasons for assuming an extended race career.

The particular point which we are here to consider is the place of the shorter scale of man-life on the longer scale of planet life, and the approximate position now occupied by our race in the shorter scale of existence. In determining the answer to this question, we have again to consider that fundamental condition upon which man-life on our globe depends, namely, heat. The existence and perpetuation of human beings upon our globe has from the first and will to the last depend upon the vitalizing power of heat on the surface of the earth. There was a time when this heat was in excess of the demands of life, and there will be a time when the deficiency of heat will lead to the certain extinction of all vital phenomena on our planet. Our globe, once superheated and afterward, as we have seen, subjected to the rigors of the glacial period, has by its endless elliptical journey through space parted with a great portion of its residual heat; and the process is still going on. As the earth speeds on in its orbit, its heat, like that of a vital body passing through a region colder than itself, streams off behind it; so that there is a constant loss of the vitalizing power of the globe.

Conditions on which the perpetuity of man-life depends.

This loss, however, is in great measure resupplied from two sources. That is, the superficial heat of the earth's surface is replenished from two fountains: first, the interior caldron, or reservoir, occupying the larger part of the planet and held in place by the outer crust of rock; and secondly, the constant contribution of the sun.

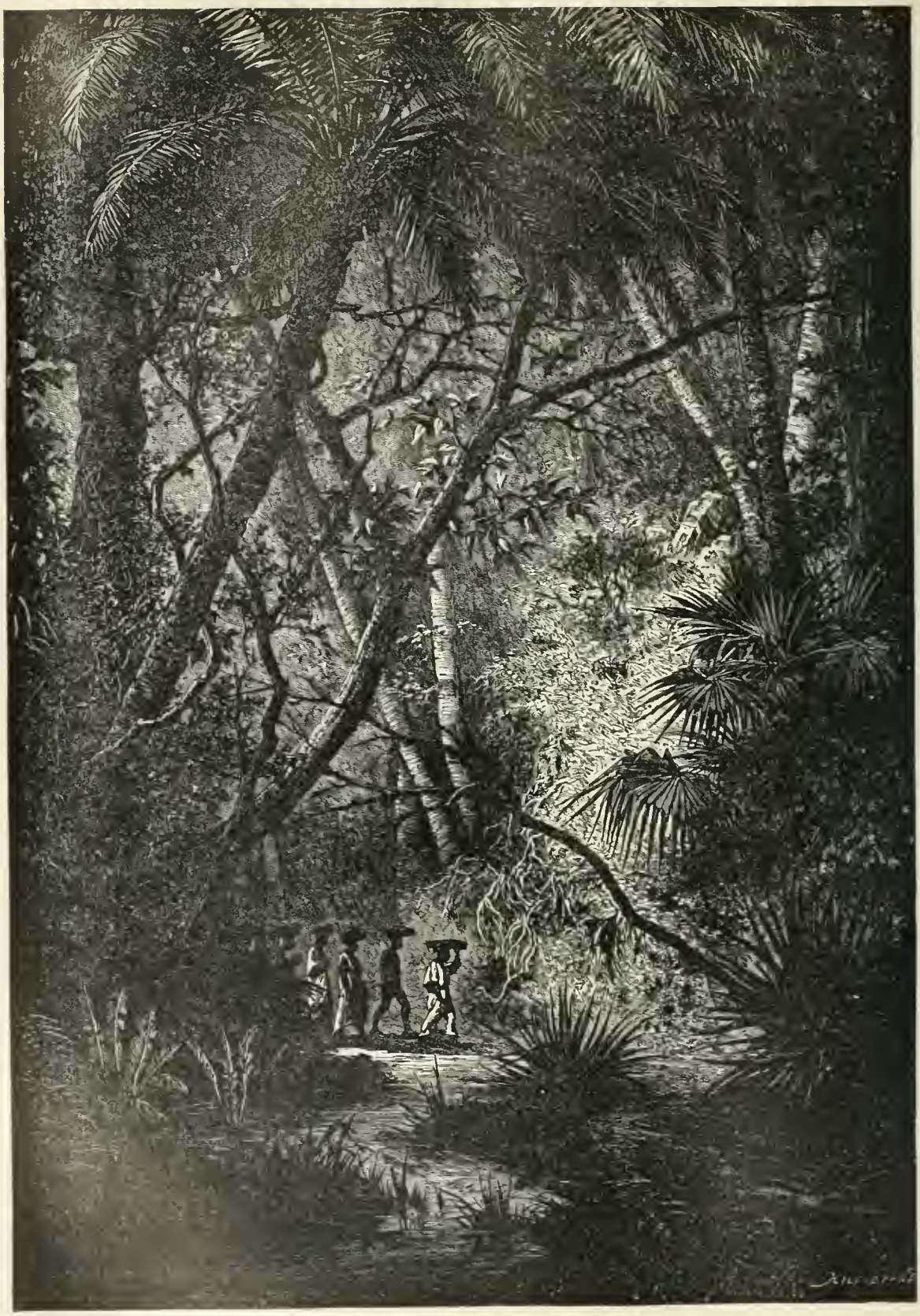
Most favorable condition for conservation of vital energy.

The human race continues its existence on the planet by economizing the vital energies of heat from the two sources just named. The best condition of all for the existence and power of man-life on the earth is that planetary stage at which the loss and the gain of heat on the surface are equal. The middle, and we may say the maximum, epoch of man-life is coïncident with that time in planet history when the wasting expenditure of heat into the surrounding spaces of our orbit is exactly counterbalanced by the radiation to the surface from the internal fires of the globe, plus the constant gift of the sun. When this condition is present, the state of the globe is most favorable for the propagation, the maintenance, and the longevity of human life. It is at this stage that the epoch of life-equilibrium is attained; and if the equipoise could be preserved there is no discoverable reason why the human race might not continue forever. Before this condition of highest equilibrium is reached all the warm-blooded animals, including man, are at a disadvantage with respect to their environment, because of the *superfluity* of heat at the surface of the earth, with the thousand concomitant circumstances of that superfluity, tending as they do to hasty growth, premature development, overexcitability of the nervous system, enervation, and all the physical vices which we observe to the present time in the tropical and semi tropical parts of the globe.

Nature of the struggle for life before and after the crisis.

After the favorable condition has been passed—as it will be in the history of our planet—the struggle of life and for life takes another form. The increment of heat constantly received at the surface becoming less than the expenditure leaves man and his fellow-animals at a disadvantage of a different kind. The struggle to exist takes the form of an effort to maintain the vital fire against the draught of nature. A large part of human exertion must needs be wasted in such a state in trying to preserve the proper envelop of heat, wasting ever and but feebly resupplied. The after history of the human race must indeed take this form of contention with the efflux of the natural world, and must recount the struggle of man, becoming ever more arduous, to maintain himself and his kind upon the surface of a globe sinking into the rigors of an endless winter. From the middle epoch, most favorable to the production and longevity of man as an animal to the end of his career, he will be put at a disadvantage, and will cease to develop under the laws of his environment. Up to that time—the crisis—when the accretion and the expenditure of heat are equal, our race development will continue. The physical, intellectual, and let us hope the moral, powers of man will continue to expand and develop. But after the crisis we may expect to wane—slowly we may believe; but the cosmic law must doubtless be obeyed.

Philosophy and astronomy have combined their resources in the attempt to determine the present condition of our heat equation and the relations of man-life thereto. The best scientific opinion has been brought to bear on the ques-



CONDITION OF EXTREME HEAT, ILLUSTRATED FROM AFRICAN FOREST.—Drawn by Alexandre de Bar.

tion, and the decision is that our planet *has not reached*, by a considerable span, the maximum of its vitality, considered as the arena of our race activities. This is to say that the world is still receiving at the surface an increment of heat more than equal to the constant waste in its progress through space. The excess is not by any means so great as it was in the previous history of the planet; but as we approach the crisis—our epoch of equilibrium between the heat given and received—the approach thereto is retarded by many favoring circumstances, thus prolonging the period of human development. While the amount of heat received from the sun may be regarded as nearly constant, the quantity given off from the earth into space diminishes by an ever-decreasing ratio. The earth as a reservoir of heat is at present better fitted than ever before to preserve it. The adamantine walls round about our vast store of internal caloric are thicker and more substantial with each succeeding geologic age, and the loss of our living energy is less and less rapid as we journey on.

Condition of heat equation with respect to man-life.

We are thus on the favorable and favoring side of our cosmic life. It is easy to demonstrate with proofs other than those here suggested that the epoch most favorable for the production and maintenance of man-life on the earth has not yet been attained. Whatever conclusions we may reach by following the astronomical suggestions above given, there is a substantial agreement among the most competent and scholarly thinkers of our times that we still have on the surface of our earth an annual gift of heat from internal and external stores in excess of our waste into space.

The human race still on the ascending scale of vitality.

It follows that the conditions for the further development of man-life on our globe are still present, and that we may comfort ourselves with the belief and knowledge that we have not as yet by a considerable stage in our ethnic life reached the highest or middle point in our race career—the period of greatest longevity and intellectual and bodily power. Our rate of progress toward that approaching crisis we are able to judge by the brief knowledge which we possess historically of the previous history of mankind. That is, we are able to estimate our *rate of progress* toward that epoch which shall be most favorable for the maintenance and duration of human life in the earth. We know from historical data that our march toward the crisis in our ethnic life is extremely slow—so slow indeed as to have left much confusion in the human mind respecting its own direction and tendencies. There have been historical periods within the limits of recorded annals in which man-life seemed to move not at all, but rather to remain stationary, or at best to move only on a level. At other times progress has seemed to be actually retrogressive. This is said of the physical life of man, of his intellectual life, and of his moral capacities and characteristics.

Our rate of progress toward the crisis considered.

From a wider point of observation, however, we can but perceive the slow but unmistakable progress of mankind from lower to higher forms of activity, to greater length of life, to superior wisdom—particularly in the knowledge of nature and of the means of subduing and utilizing her magnificent energies—to nobler aspirations and worthier achievements, to higher purposes and to grander concepts of the universe.

Slow movement of mankind toward higher development.

Here again the slow rate of progress which the human race has made in its

course during the brief period of recorded history gives us a distinct hint of the long prehistoric extent of man-life on the earth. It is easy for the geometrician from a small arc to determine the extent and character of the whole circle. The indications to which we have just referred may serve a like purpose to the ethnologist and philosopher in estimating the extent and variety of our race career before our coming into the epoch of conscious history.

We have a traditional and historical knowledge of mankind extending over several thousand years. The knowledge thus derived is sufficiently clear and authentic as to the character, activities, and duration of human life in remote antiquity. In some particulars the progress since the earliest date of recorded annals has not been great. In intellect, pure and simple, the races of to-day hardly surpass, if indeed they equal, some of the favored peoples of the ancient world; but in most respects progress can be discovered in every particular of the life and career of man. One of the most marked of these improvements is the matter of longevity. Notwithstanding the temporary wreck and devastation of the Middle Ages, it can not be doubted that human life is on the average more stable and enduring than it was four thousand years ago. The average period of human existence is greater than it was at the Renaissance; greater than in the age of the Antonines; greater than at the date of the Trojan War; greater than when the Vedic hymns were sung by the Brahmanic shepherds.

Historical hints of our present stage in race career.

More remarkable by far has been the gain in the means of subsistence—the methods of taking from earth and sea the materials on which the support of human life is founded. The capacities of the earth have been discovered and utilized. The mother of all has been made to bring forth her gifts in their season, and the ability of maintaining life has been given to a greater number and in larger measure than ever before. As to the increase and accumulation of knowledge, the gain has been most marked of all. The race has been made acquainted with the laws and phenomena of its environment, and nature has been converted from a foe into a friend and servant of man. The elements so long considered hostile have become propitious under the dominion of scientific knowledge, and the maintenance of life has become easy and universal.

Gains of mankind in mastery of the environment.

All of these facts, merely touched upon in this connection, agree substantially with the theory of the improving habitability of the earth. The scientific concept that the planet is still improving as a world suitable for the habitation of rational intelligences is borne out by the facts of the improved and ever improving conditions of human life. The great cosmic law is exemplified in that small segment of human experience which goes by the name of history; but the whole significance of the argument lies in this, that the *rate* of improvement in the human race, the increase in longevity, the multiplication of the means of subsistence, and the permanent increment of knowledge, have been so slow in movement and so small in the aggregate since the beginnings of recorded time as to convince us that the whole circle of man-life is a circumference of vast extent. Every fact and circumstance within the range of our information points clearly to the long-extended duration of the human period, and every condition under which we live on the

Facts indicating improving habitability of the earth.

earth, and have lived in the past, opposes itself with persistency to the supposition that we are at the present time near either the beginning or the end of our race career. The phenomena of life, that is, of human life, are all so intimately related and correlated with the phenomena of planet life as to convince us that, though the planet life has a wider sweep of duration than the race-life of mankind —though there were antecedent ages of preparation for the appearance of man, as there will doubtless be succeeding ages to his disappearance from the surface of the globe—the date of the beginning of rational being on the planet was remote from the present by multiplied thousands of years, as the date of the disappearance will be remote by multiplied thousands to come.

We may here with propriety add a few paragraphs drawn from the conception of design in the universe. It is not intended in this connection to place so great stress upon a plan and purpose in universal nature as was done by the natural theologians of the last century. Much less is it intended to intimate the *absence* of purpose and design in that vast and magnificent system of worlds of which our own is but an insignificant example. That the universe is orderly can no more be denied than that it is grand and magnificent in extent and variety. If the thing for which the old mythologists invented the name of Chaos ever existed, it exists no longer, at least not in those tremendous fields of space which have been penetrated by the great telescopes of modern times. So far as our solar system is concerned, the chaotic element, if ever present, has wholly disappeared. The belt of the asteroids may, indeed, represent the path and the fragments of a former world; but even in this region of space the reign of law holds all things in its beneficent grasp. In all other parts of our system regularity in worldhood appears to right and left. Adaptation is discoverable. Reason seems to prevail. The universe *appears* to be the habitation of intelligence and purpose.

Concept of design points to an extended race career.

Without following, beyond the suggestion of a just rationalism, the hints of design, of regularity and plan, in the universe, and in our own world in particular, we may well accept the belief of an adaptation of the planetary spheres to the abode of rational intelligences like ourselves. Thus much being granted, it is but a step to the conclusion that the principle of duration might be expected as a part of the plan of worldhood. Given the habitability of a planet as a part of its purpose and plan, and the concept of permanence, or at least great duration, follows as a necessary inference. Why, indeed, should a world be habitable for the highest order of beings only for a brief season? What possible reason could be assigned for the late appearance and early extinction of the highest and best form of intelligent existence? If our own earth, for instance, had in it from the first the condition and prophecy of habitability, as it undoubtedly did have, and as we are at liberty to infer all other planets have, then why should there be a period of preparation almost infinite in extent to be followed only by a brief and quickly vanishing residence of the noblest of all the creatures? Every condition of right thinking leads to the belief that the appearance of man on the planet would occur at the earliest practicable moment (so to speak), and that mankind would continue to flourish to the latest practicable date. It is one of the novel con-

Long duration to be expected in the plan of worldhood.

tradictions in the philosophy of a certain school of thinkers that they would have us believe that the earth, fitted up as it were for the dwelling place of man, lay green and virgin, waiting for his appearance through eons of useless time—all this for no better reason than to satisfy the preconceptions of some impossible system of chronology.

Such short-sighted views of nature consistent with the astronomical and geological preparation of the globe. Reason and fact alike require us to accept *as early* a date for the appearance of man as the design of the world and its conditions of habitability will admit. The results of reason must be accepted in a world governed by law. That the date of man's appearance was coïncident, or nearly coïncident, with the

LANDSCAPE OF THE LOWER OÖLITE (BEFORE THE AGE OF MAN).—Drawn by Riou.

and of man we may at once dismiss as belonging to the ignorance and blindness of a former age. While the demands of right reason do not call for a limitless extension of man-life into the past, and while such a view is contradicted by scientific data which may not be doubted, a rational concept of the human race in relation with the planetary life upon which it is maintained does call for as wide and far-reaching an arena as is astronomical changes in the character of the earth's orbit heretofore described, can not well be doubted by any one whose mind has been freed from narrow preconceptions on the subject. That our race career, measuring backward through the brief historical and traditional periods of our ethnic life, has extended far enough into the past to cover a considerable part of the planet life with which it is associated, is a conclusion warranted by every condition of

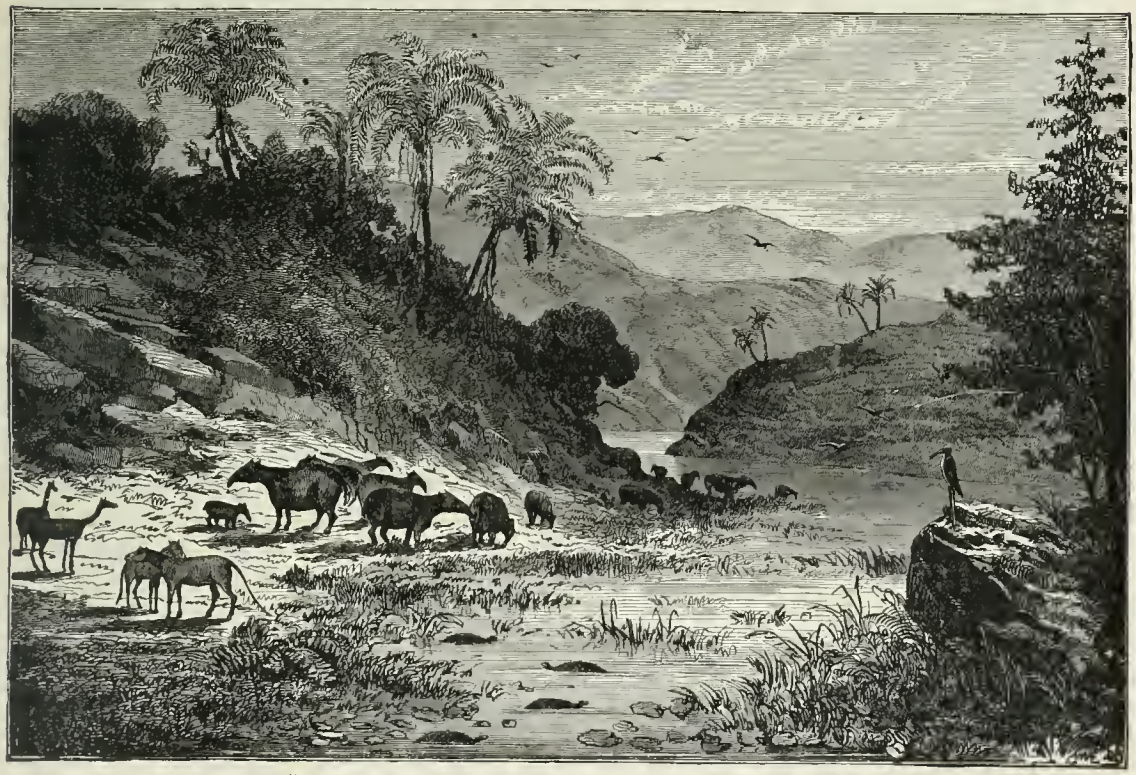
Right reason demands an early date for appearance of man.

right thinking. That the design of the world and of our solar system points to a long-continued career for the highest form of living intelligences on its surface can hardly be doubted by him who believes the universe to be underlaid with plan and purpose. Finally, that our own race, by its slow rate of progress, has not yet attained the maximum of its power, longevity, and rational activities, is a fact which we may accept at the hands of science as demonstrable from existing data.

CHAPTER III.—ARGUMENT FROM GEOLOGY.

TURNING then from the astronomical to the geological argument respecting the antiquity of man, we shall reach the same general views, the same conclusions as above. We are not to enter here into the broader discussion of the geological age of our planet, but only to note the epoch in which it became habitable for the human race. The science of geology belongs virtually to the present century. Hitherto any truly scientific concept of the formation and character of our globe was wanting. All the former achievements of mankind in geological inquiry were not equal in extent and variety to those which have been made by the geologists of the nineteenth century. The result has been a tolerably

Geological science a product of the present century.

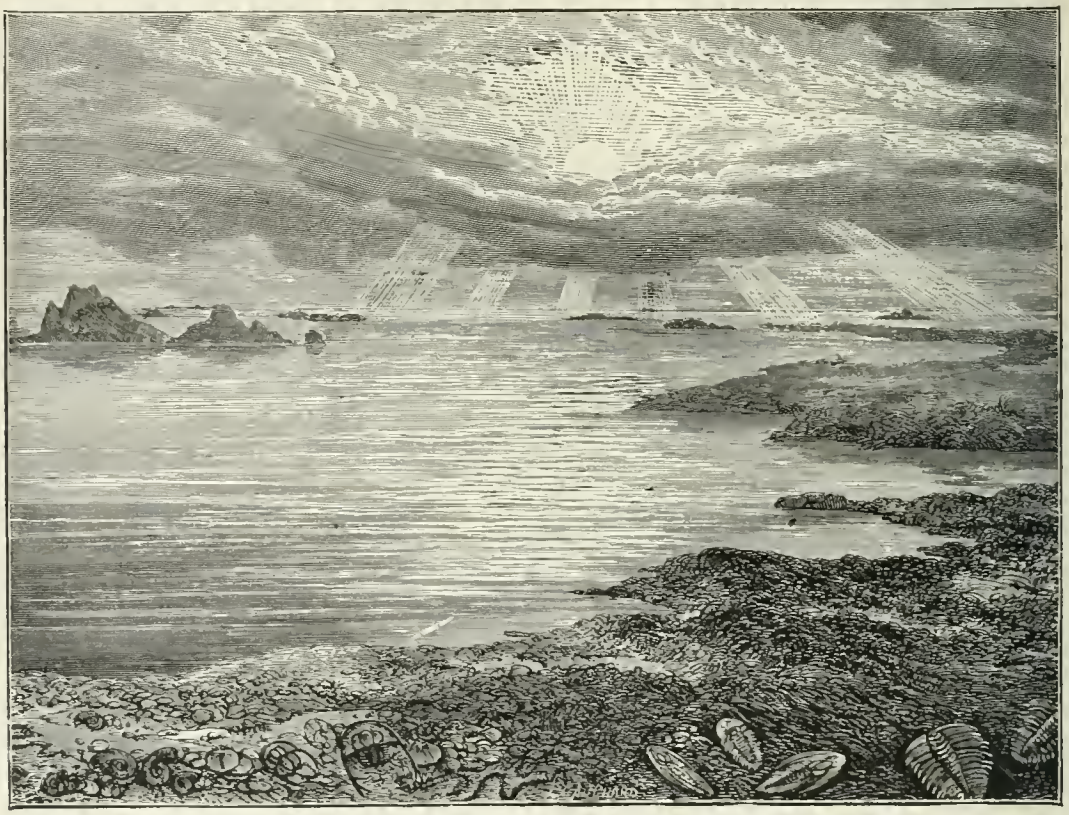


PALÆOZOÏC AGE OF THE EARTH.—LANDSCAPE OF THE EOCENE.—Drawn by Riou.

complete investigation of the character of the earth's crust and of the order of world formation. A summary of these results may here be presented with a view to showing the epoch of man.

Outline of the order of the geological ages.

In the bottom of the world we have the azoïc, or lifeless, age. Above this, and next in order of succession, we have the palæozoïc age; that is, the ancient life period of world formation. Above this and succeeding it we have the neözoïc, or new-life, age, reaching to the surface and including the present life-forms of the world. For convenience, the neözoïc age has been divided into a lower, called the secondary, or mesozoïc, period; and an upper, called the tertiary epoch. The palæozoïc age, if we begin at the bottom, next to the azoïc rocks, includes the Cambrian, the Silurian, the Devonian, the Carboniferous, and the Permian strata of the earth's crust. The secondary rocks of the neözoïc age include the Triassic, the Jurassic, and the Cretaceous, or chalk, formations. The tertiary, or cænozoïc, rocks are divided into what are called the eöcene, the miocene, and the pliocene, and above these we have the superficial formations known as the post-tertiary, quaternary, pleistocene, or most recent deposits of all. This sketch includes what are known as the fossiliferous strata of the world, reaching downward from the present fauna and flora of the surface to the lifeless bed of the azoïc rocks.



PALÆOZOÏC AGE OF THE EARTH.—CAMBRO-SILURIAN LANDSCAPE.—Drawn by Riou.

It is needless to urge upon the attention of any intelligent reader the great periods of time which are indicated in the geological formation of the earth. How great these periods are has never

been determined, and it is possible that their duration may remain indeterminate to the end of time. But approximations can be made which are highly useful, and many scientific data exist by which previous calculations may be rectified. Every decade witnesses an increment of knowledge to the subject before us, and wider and more accurate generalizations are gradually building up an accepted theory of the geological age of our planet.

Exact time measurement not required in world history.

PALÆOZOÏC AGE OF THE EARTH.—Devonian Landscape.—Drawn by Riou.

The question may well arise by what possible means the inquirer can arrive at any practical conclusions relative to the lapse of time in former periods; that is, in the prehistoric ages of our world. It may be appropriate, in view of this just skepticism, to cite a few of the facts and principles by which such investigations are conducted. In the first place, the rate of geological change now going on in the earth is a matter of observation and scientific measurement. The slow but steady transformation of the earth's surface, the reduction of its inequalities, its tendency toward the level, its failing adaptations to certain forms of vegetable and animal life, and many other of our superficial terrene phenomena are well-known facts, and have been observed in their processes for a sufficient period to warrant scientific deduction as to both the future and the past.

Principle of determining the rate of geological changes.

To this we must add the accepted law of the uniformity of nature, upon which, indeed, all science rests as upon an immovable foundation. We may safely assume that the processes of the natural world which we observe around

Acceptance of the law of the uniformity of nature.

us are the same processes which have been giving form and feature to the surface of our planet through eons of past time. True, we may not assume that the rate of change has been uniform for successive geological ages. On the contrary, experience and observation within the historical period have shown that the rate of change is not by any means invariable. At some epochs transformation goes forward more rapidly than at others; but on the whole, not only the process of change, but the rate of change may be depended on as scientific factors in determining the past conditions and periods of duration in geological history.

LANDSCAPE OF THE CARBONIFEROUS PERIOD.

It may be well in this connection to illustrate with a few specific examples the general laws of change to which we have just referred. We have in the United States an example of the action of the elements which may well convince the most skeptical of the value of geological physics in determining the lapse of time. This example is furnished by the chasm and recession of the Niagara river. It is easy to trace the course of the great falls backwards from lake Ontario, or at least from Lewiston, to the present position of the cataract; and it is easy to foresee the inevitable recession of the chasm back from the present fall to lake Erie. We may already contemplate (at a date how remote!) the wearing away of the channel until the Niagara river shall lie in the bottom of the chasm all the way from Ontario to the exhausted bed of Erie. The rate of the recession of the falls is a thing of observation and measurement. It has been placed as low as eight feet in a century. Other estimates have been higher; but fast or slow, the process of wearing away goes steadily on, as it has done in the past, and nothing is required but scientific observation to determine approximately the length of time which has been required to wear out the channel from Ontario to the present falls.

Suggestion furnished by the recession of Niagara Falls.

Of a certainty several circumstances must be kept in mind and admitted into the calculation which may modify the deductions. The stone in some parts of the river platform may be harder and in others softer. There may be occasional rents and fissures which, under pressure of the floods, will permit large masses of

Argument not destroyed by elements of uncertainty.

the supporting ledge to break away and be carried down at once. But these circumstances are only modifying elements in the problem, for which indeed allowance must be made, but which should not be permitted by the uncertainty which they introduce to destroy the scientific character of the investigation. There is not wanting a certain kind of mind filled with reäctions and prejudices, and for that reason ever disposed to resist the progress of scientific truth, which is prone by its constitution and habit to seize upon any element of uncertainty which may exist in an investigation of this kind, and to use that modicum of uncertainty as a reason for rejecting the whole inquiry, and for falling back into the easy nest of mediæval preconceptions and ignorance.

Another instance of geological change which may be used as a measure of time is that of the rise of the valley of the Lower Nile, by the deposition of matter from the annual overflow. It is popularly supposed that quite a deposit is left each year in the Nile valley as a sediment from the swollen waters. If it were suggested, for instance, that the annual deposition amounted to a fourth of an inch, it would not seem an astonishing proposition; and yet a little reflection will show that at such a rate the Nile valley would long since have disappeared and the river would have been turned back upon its fountains in the Sudan! A fourth of an inch annually would amount to more than two feet for each century; a little more than twenty feet for a thousand years; about forty-two feet since the times of Cæsar; and much more than a hundred feet since the age of Ramses! As matter of fact, the elevation of the lower valley by the annual deposit has not been more than about five or six feet, as measured at Rosetta or Damietta, within the historical period; from which fact we may scientifically determine the thickness of the annual deposit as little greater than that of a sheet of paper. This slight increment, however, when once it has been scientifically measured, is good for the past, the present, and the future, serving as a measure not only of historical but of geological time, and furnishing incidentally a striking example of the slowness and orderly progress of those physical changes by which the surface of the earth and its distinctive features have been determined.

Rate of deposition in the Nile valley furnishes a scale.

Still a third example of time measurement by means of physical conditions may be appropriately cited. The time was when the mass of the earth was fluid through its whole extent. If, while the globe was in such condition, the rate of rotation on the axis had been rapid, the equatorial distention would have been correspondingly greater than it is. With a very rapid rate of rotation the earth would have become a thin wheel or circular plate. On the other hand, if the rate of revolution on the axis had been as slow as that of our own secondary, the moon, the equatorial protuberance would scarcely have been discoverable. As a matter of fact, the elevation around the equator is somewhat greater than it would be with our present rate of planetary revolution. This is to say that when the earth was still in a fluid or semifluid condition, and its general form was determined by the rate of axial revolution, the motion was more rapid than at present. With the hardening of the crust, the globe was able to maintain its oblate spheroidal form even when the rate of revolution was considerably slackened.

Spheroidal form of the earth a datum for time measurement.

Approximate date at which our earth took its present form.

Astronomical science is now able to determine the rate at which our axial revolution has diminished, and we may thus calculate backwards to the time when the globe was fixed in its present form. We are thus able to reach by approximate time measurement the date at which the crust of the earth became sufficiently firm and thick to preserve the form which the globe had taken under physical law while still in a state of fluidity. Sir William Thomson, following the theory of Fourier, showed by an elaborate argument, published in the *Transactions of the Royal Society for 1862*, that the lower limit or minimum date at which our globe, under the action of physical laws, could have taken its present form and become superficially consolidated, could not have been less remote from the present than twenty millions of years. His calculations were mathematical, and were based upon the established laws of physical science. While we may not accept his conclusions with such certainty as might be had in the case of computations resting on known and invariable data, we may, nevertheless, conclude, tentatively, that the form of our globe—its solidification at the surface and its assumption of the oblate spheroid as its permanent figure—occurred at a date fully as remote as that declared by Sir William Thomson.

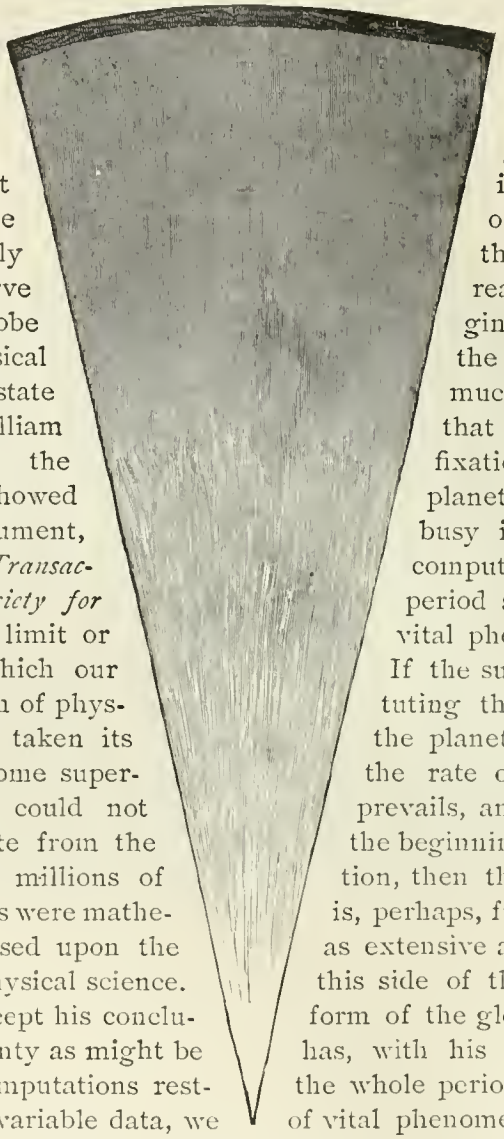


DIAGRAM SHOWING RELATIVE THICKNESS OF EARTH'S CRUST AND DEPTH OF INTERNAL CALDRON.

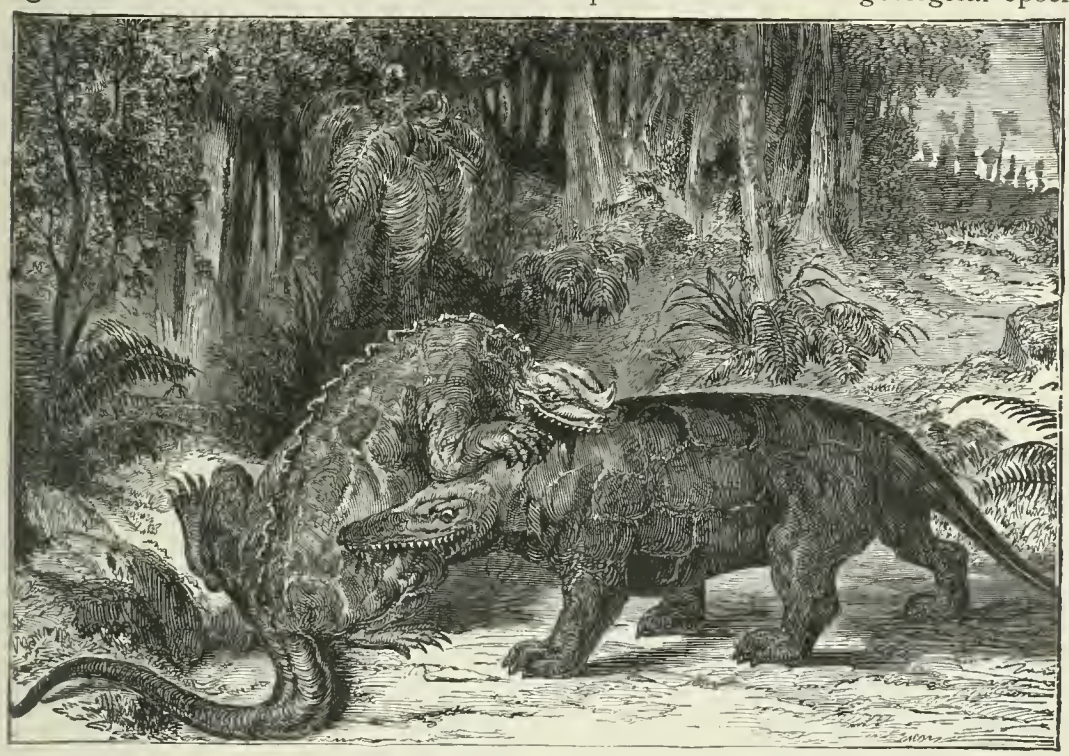
Life began before fixation of globe; Croll's estimates.

The earth had become the arena of vegetable and animal life before the fixation of its form. Long before the instability of the surface of the globe had given place to permanence, the rudimentary forms of life had appeared and begun to flourish. This is to say that the epoch of life considered from the standpoint of geology reaches back for its beginnings at the close of the azoïc age to a period much more remote than that assigned for the final fixation of the figure of our planet. Geologists have been busy in like manner with computations for the entire period since the beginning of vital phenomena on the earth. If the successive strata constituting the superficial parts of the planet have been formed at the rate of change which now prevails, and has prevailed since the beginning of recorded observation, then the entire epoch of life is, perhaps, from three to five times as extensive as the period which lies this side of the final fixation of the form of the globe. Dr. James Croll has, with his usual skill, calculated the whole period since the beginning of vital phenomena on the surface and in the waters of the earth at a period not less, and probably greater, than sixty millions of years. Other eminent geologists, reasoning from like data, have been disposed to increase rather than diminish this estimate. Sir William Thomson has suggested a period of a

hundred million years as an approximate inferior limit of the date when the first forms of life appeared on the earth.

There is, however, a full concurrence of opinion that man-life occupies but a relatively small part of the whole scale of vital existence. We have already shown that according to the best data and most approved deductions the human being was one of the latest to make its

Only a small part of the life epoch occupied by man.



FORMS OF LIFE IN CRETACEOUS PERIOD (PRECEDING THE AGE OF MAN).—Drawn by Riou.

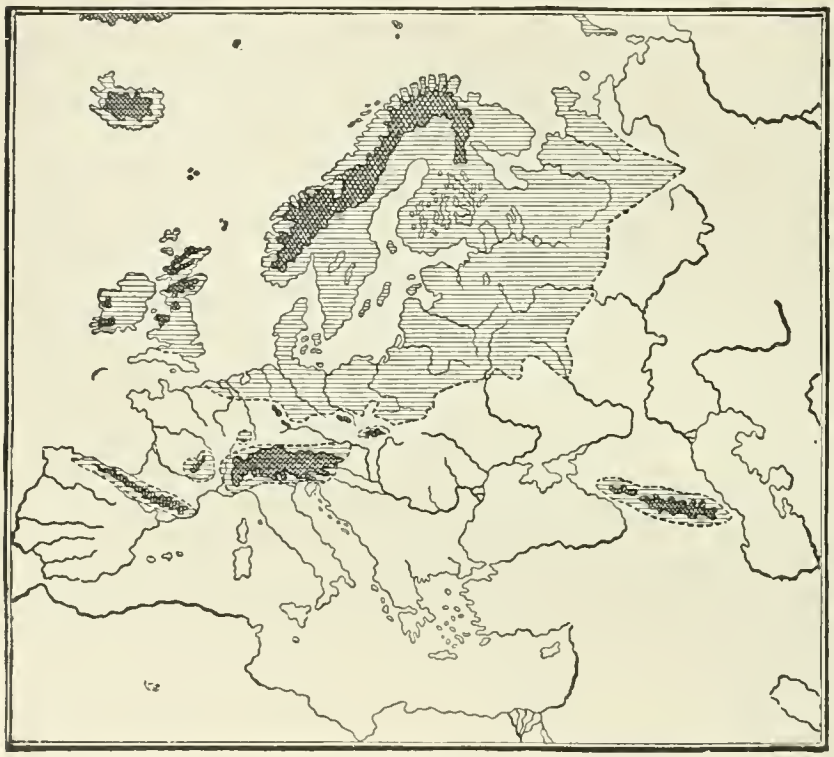
appearance. It is only in the tertiary, the post-tertiary, pleistocene, or so-called recent deposits of the earth's crust, or at furthest in the miocene, that the remains of man and of his activities are found. True, we may not reason positively to the nonexistence of human beings before the diluvian age. It is possible that such creatures as ourselves had existence on the earth in the preglacial epoch; but there is no probability of the truth of such a hypothesis.

True it is, as is constantly shown by experience and observation, that human remains proper easily perish and are resolved into the elements. It requires no great period of time, when the human body is exposed to the free action of nature's forces, for it to be completely transformed into its elementary gases and mere dust. Only under the most favorable conditions can the skeleton of man be preserved from one geological epoch to another. When these favorable conditions do exist, as we shall see hereafter, the actual relics of our species are preserved from age to age with scarcely a perceptible mark of change.

The analogy between animal and vegetable bodies is in this respect complete. With exposure grains of wheat and seeds of various plants and grasses are quickly resolved into their constituents; but wheat grains, still preserving their vital germs and capable of growth

and reproduction, have been taken in recent times from the Egyptian sarcophagi where they were deposited as much as three thousand years ago. A single find and demonstration of this kind is sufficient to establish the law of vegetable and animal preservation under favorable conditions. The absence of such discoveries does not positively disprove the existence of given forms of life in past geological ages; but the fact that no single example of human remains belonging to the pre-glacial period in geology has been found, while not conclusive of the nonexistence of our race in a period so remote, is sufficient to destroy the probability.

Possibility of long preservation of organic remains.



SKETCH MAP SHOWING (IN DARK LINES) THE PART OF EUROPE UNDER ICE COVER IN GLACIAL PERIOD.[1]

It is, then, in the post-glacial, or diluvian, age, and in the earlier parts thereof, that we are warranted by geological evidence in placing the apparition of man on the earth. In order to make clear the conditions under which such remains have been discovered, it is necessary to revert again to several situations which are peculiar to the recent period in geological history.

One of the places or conditions most favorable for the deposit and preservation of the relics of man-life is the loam in the bottom of caverns; that is, in caverns having a certain relation to rivers. A second favorable position is that of river alluvia proper, namely, the masses of accumulated gravel and detritus borne along by running streams and deposited in the bends or eddies, or more particularly spread out in broad, deep layers near the débouchure of the rivers with the larger bodies of water into which they fall. A third place favorable for the preservation of animal and vegetable remains is the bottom of lakes. A fourth is the collection of peat mosses in the countries where such formations exist. A fifth is the sand dunes heaped up in certain localities by the action of the winds or thrown into place by the joint action of the winds and sea.

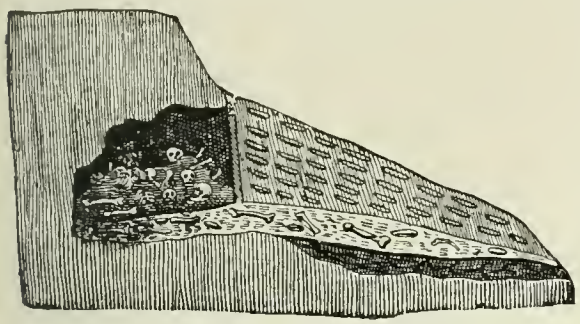
Situations most favorable for preserving human relics.

Of all these situations, perhaps the

[1] The *darkest* portions of the map show the present areas of the ice fields.

first is most favorable for the prolonged preservation of human relics. The great majority of subterranean caverns have been formed by the action of water. Underground streams frequently carry away the softer parts of the rock or formation through which they pass, leaving chambers and cavities of large extent. After these nether vaults have once been formed the streams may disappear or dwindle to a trickling branch in the bottom. Frequently the caverns so formed are left entirely dry. In many parts of the European countries the rivers flow through districts where the chalk formations are abundant and are favorably situated for the production of caverns and grottoes. In former ages, while the glacial rivers were still of great width and volume, the beds lay at a much higher level than at the present time. In such countries the formation of underground tunnels by the action and pressure of the waters was a common phenomenon along the river shores.

Formation and peculiarities of man-caverns and grottoes.



SECTION OF CHALK CAVERN WITH HUMAN REMAINS

In course of time the rivers of the diluvian period, as we have said above, receded and sank with diminished volume into the lower parts of the valleys. The beds were cut to greater and still greater depths, until at the present day it is a common circumstance, both in Europe and America, to find the water surface of running streams as much as a hundred feet or more below the level formerly occupied by the river. Almost every considerable stream presents on either side a secondary terrace of drift which, at a former age, marked the level of the bed. With the recession of the waters to the present channels, the caverns formed in the old diluvial banks, especially those in calcareous regions, have been left dry. The mouths of such alluvial grottoes open on the hillsides, facing the rivers, and it was into these caverns that the animals, including primeval man, made their way as places of natural resort in the earlier ages of the postglacial epoch.

In the bottoms of nearly all of the caverns are found a certain residual of loam, or cave-earth, swept in as sediment by the departing waters; and over this loam there is usually a solid layer of stalagmite. Whatever organic remains were left in the caverns in the age of the deposit were, as a rule, mixed with the loam, and afterwards covered and, as we

Date of remains indicated from geological data.

EXAMPLE OF STALAGMITIC FORMATION.

might say, hermetically sealed, with stalagmitic material. It is easy to perceive that a study of the rate of diminution and sinking away of the rivers from their former elevation into their present beds would furnish a measurement of time for estimating the date of the deposit of the human relics referred to. In so far, therefore, as geology is able to determine the time at which the alluvial caverns were formed and at which the receding waters left them subject to habitation, she is able to suggest an approximate date for the appearance of man-life on the earth.

The facts here referred to, which in the nature of the inquiry must be mentioned in many parts hereafter, are now brought forward solely to illustrate the possibility of time measurement in the prehistoric ages. This fact must be borne in mind by the reader. The same should be said respecting the alluvial deposits of gravel and other detritus containing the relics of animals and men. The gravel beds at the mouths of rivers have been gradually formed through immense periods of duration. The slow rate of such accumulations is a fact noted and emphasized by all candid and capable observers. The course of rivers on their way to the sea is, as a rule, not rapid, and in those portions where rapids exist we find almost invariably that the waters are supported by the hardest and most enduring ledges of rock. The action of water courses is therefore slow. To erode such channels as we find to have been formed for the passage of rivers must have required almost immeasurable periods of time—periods in which centuries rather than months and years must be the units of measurement.

EXAMPLE OF STALACTITE.

Slow process of formation of alluvial river beds.

It is by the erosion of their beds that rivers gain the material in the forms of sand and gravel which they deliver in certain parts of their course and more particularly at their mouths. One must needs note the vast accumulation of gravel and other detritus brought down from distant regions and spread out in beds of miles in extent, if he would gain an adequate idea of the length of time which has been required to furnish such accumulations of matter. The most eminent geologists have given close study to the subject of the rate of formation for the alluvial deposits, and though they have not agreed with any near approximations in the results at which they have arrived, in one thing there has been concurrence among them all, and that is the vast lapse of time requisite to produce the given results, and the consequent remote date which must be assigned to the remains found in the alluvial strata at the mouths of rivers.

Vast reach of time required to complete such formations.

An examination of the sediment accumulated in the beds of lakes has led to the discovery of many traces of organic life belonging to the prehistoric age. In such situations the remains of human

beings have been found, as we shall hereafter note with more particularity, associated with the bones of animals long extinct. In this case, however, the attempt to determine the time of the deposits has been less successful from the peculiar character of the data than in the case of caverns and river beds. The rate at which the sediment has been deposited in the bottoms of lakes is a very uncertain factor, and though the position and depth, below the surface, of the sediment led to the conclusion of a great antiquity, geologists have not succeeded in measuring the intervening time between the deposition of the lake fossils and the present.

Less certain results from examination of lake bottoms.

In the case of the peat mosses better success has been attained, and the same result reached as from other sources of inquiry. The peat bogs are found in peculiar localities, and the superincumbent earth has accumulated by regular accretions of growth and decay which may well furnish the proper data of time measurement. The character of the vegetation prevalent at the time when the peat mosses were laid, and when they received their relics of human life, may be easily referred to certain geological periods, the date of which may be approximately known. Certain kinds of forests, long since extinct and supplanted by other kinds belonging to a later cycle, are thus known to have prevailed at a time when primeval man was in the earth; and by estimates made on scientific grounds for the date of the given forest, an approximation may be reached for the time of the appearance of the human race.

Peat bogs furnish a better basis for time estimates.

LANDSCAPE OF THE PEAT BOGS.

Of the sand dunes which are found in certain localities, holding the relics of primitive men, the same may be said as of the lake bottoms, namely, that the measurement of time applied thereto is difficult, if not impossible. The forces which produce the sand dunes, whether terraqueous or acqueous, are comparatively irregular. It is easy to understand how a sudden cyclone might by torsion heap up the sand of seashores or desert places into the forms which we

Uncertainty of evidence gathered from sand dunes.

now discover, though in other instances it might require ages for such accumulations to be made.

In some instances, however, the dunes are clearly the result of human agency, being composed of the débris of primitive dwelling places scattered about the homes of the first men until heaps amounting to considerable mounds were found. In such cases we may well allow long periods of time for the formation of the dunes. It is a fact of observation that it requires many centuries in thickly populated localities to raise the surface but a few feet above its former level; this, too, where the agencies of civilization have been actively operative in leaving a residue. The Appian Way of Rome, after more than two thousand years, is no more than two or three feet below the level of the surrounding country. It is, therefore, safe to conclude that the primitive dunes left around the dwelling places of the first men were slowly formed through many centuries of time.

If we take up the actual estimates which the best geologists have given for some of the dates suggested in this inquiry, we have the same tangible and instructive results. Sir Charles Lyell, one of the greatest of geologists and conservative thinkers, has in his work, *Travels in North America*, undertaken to estimate the rate of formation in the delta of the Mississippi river. That low-lying terrace of alluvium has an area of about thirteen thousand six hundred square miles. Sir Charles by investigation discovered that the thickness of the deposit is of an average of about five hundred and twenty-eight feet. From these data he was able to compute approximately the whole quantity of matter brought down by the Mississippi since the establishment of the river in his present bed. The next class of experiments related to the amount of solid matter in each cubical foot of the Mississippi waters. It was found that about one three-thousandth part in volume of the water discharged into the gulf is composed of mud, sand, and other detritus. The percentage in weight of solid material is about one part in twelve hundred and forty-five. Pursuing the line of reasoning and computation here suggested, and assuming the law of uniformity, Sir Charles Lyell came to the

Time required for deposition of the Mississippi delta.

SAND DUNES OF EL-FEVANE, ARABIA.—Drawn by D. Grenet.

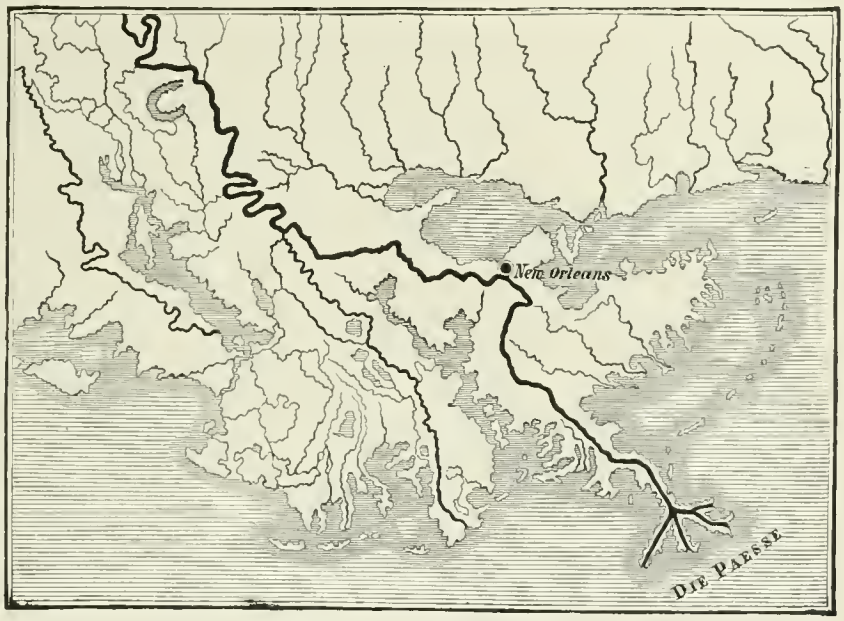
conclusion that at the rate of three thousand seven hundred and two millions of cubic feet annually it would require sixty-seven thousand years for the building up of the Mississippi delta in the form in which we now find it.

In this computation there are one or two serious questions to be raised. In the first place, it is undoubtedly true that in the earlier periods of the diluvian age, when such rivers as the Mississippi were greatly swollen and much more perturbed than at present, the quantity of solid matter annually brought down by the floods was much greater than at the present time. It is easy to conceive of a condition in which the percentage of mud and gravel in river water should be many times greater than at the present. We need go no further than the spring rains of each year in our present climatic condition to note the large quantities of solid matter that are carried down into our river currents. Doubtless, in the times of the formation of river beds, when the overwhelming waters, new melted from the glacial spurs, were rushing along the surface of valley lands to seek a permanent channel, the amount of solid material cut away, mixed with the waters and borne onward in a volume of slush to the sea, was vastly in excess of anything of like kind which now falls under our observation. Even to the present day there are large rivers whose sloppy floods bear down a quantity of solid matter so great as to build up large sand bars and gravel banks in a comparatively short space of time.

Allowance made for elements of uncertainty in problem.

It is, therefore, reasonable to suppose that in the early age of the Mississippi the annual deposits at the delta were much more extensive than they have been within the historical period. On the other hand, however, a counter-vailing circumstance must be noted which has tended strongly to prolong the period of formation in alluvial deposits. This is the fact that when the primitive rivers were still swollen and much mixed with solid materials the current was so heavy as to bear those materials far out to sea. The strong probability is that in the case of the Mississippi the earlier and heavier masses of solid matter were borne out by the immense floods and deposited in

Influence of the heavy volume of the diluvial rivers.



DELTA OF THE MISSISSIPPI.

the bottom of the gulf, so that it may well be doubted whether the larger contribution of solids in the earlier ages was not actually unfavorable rather than favorable to the rapid building up of the delta.

Two additional facts should be noted in connection with this particular subject. The first is that investigations subsequent to those made by Sir Charles Lyell and by geologists of the highest reputation have in general terms corroborated his estimates. Sir John Lubbock, traversing the same ground, has arrived at virtually the same conclusions with Sir Charles Lyell, and the latter at a later period of his life, reviewing the whole subject in his work on the *Antiquity of Man*, is more disposed to increase than diminish his estimates for the lapse of time requisite in the formation of alluvial deposits.

Other estimates confirm the calculations of Lyell.

The second fact referred to is the approximately coïncident results reached by Sir Charles Lyell and those deducible from the astronomical tables of Croll respecting the date of the formation of the post-glacial rivers with the attendant phenomena. It will be remembered that the last epoch of planetary winter, coïnciding doubtless with the glacial age, was about a thousand centuries ago. Making allowance for a considerable period thereafter to cover the time when under more favorable conditions the ice cupola of the northern hemisphere should melt away with sufficient rapidity to feed the glacial rivers, we arrive at a date comparatively the same as that which geology assigns for the beginning of the delta of the Mississippi.

We have referred on a preceding page to the deposits of the Nile valley as a time measurement for geological and human history. To this subject much patient effort has been given. Professor Leonard Horner, of Edinburgh, a noted geologist of the first half of the present century, was sent out in 1851 by the Royal Society of Great Britain to investigate the antiquity of Egypt as determined by the rate of alluvial deposit. In the time of Herodotus it was believed and taught by the Egyptian priests that their country of Lower Egypt had in former ages been an arm of the Mediterranean, reaching far up toward the site of Thebes. It was from this consideration and the belief that the sea had been driven out by the impact of the river and the deposition of sediment that the priests were wont to declare that their country was the gift of Father Nile—a form of speech which, though mythological in appearance, is scientific in its subject-matter. For it can hardly be doubted that that Egypt, which was perhaps the first abode and arena of a civilized life of man, was literally the gift, that is, the product, of the Nile.

Inquiries into the rate of formation of the Nile valley.

Before the visit of Horner to Egypt the savants who accompanied Napoleon on his Egyptian campaign had undertaken the like problem of determining the geological age of the country by estimating the rate of annual deposit from the inundation of the Nile. The estimate made by these philosophers was five inches of elevation in a century. It was found, however, that the rate of accumulation was more pronounced in some parts of the valley than in others; and Professor Horner determined to conduct his experiments on the sites of two ancient cities, Heliopolis and Memphis. In the first of these stood the famous obelisk, and in the other the statue of Ramses II. The date of the building

Deductions of French savants; Horner's investigations.

of these two celebrated monuments is known with approximate certainty. The obelisk was erected about two thousand three hundred years B. C., and the reign of Ramses, according to the chronology of Lepsius, occupied the larger part of the fourteenth century B. C.

Principal data from which calculations of Horner were made.

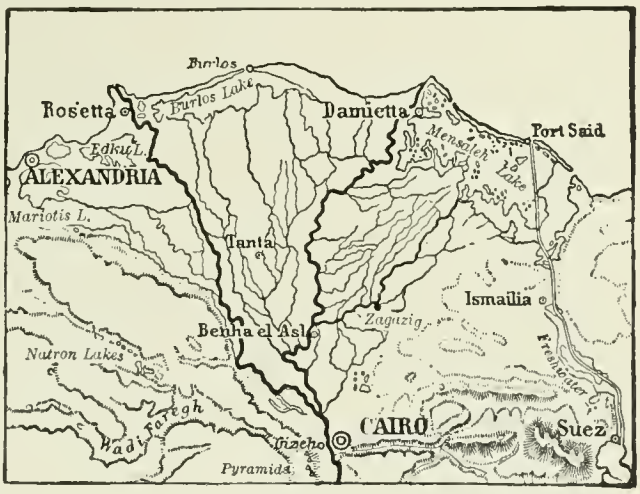
It was the theory of Horner that, having laid bare the foundations of these monuments and discovered the level of the plateaus on which they were built, he might easily compute the rate of accretion from the overflow of the Nile. The explorer found that there had been deposited around the obelisk during the four thousand one hundred and fifty years of its existence eleven feet of sediment, which by an easy calculation gave the result of three and eighteen hundredths inches to the century.

In the case of the statue of Ramses it was found that the surface had risen by a little more than ten and a half feet above the platform on which the statue rested. But he was led to believe that this platform was fourteen or fifteen inches below the surface at the time of the building of the colossus. Making the proper reduction and accepting the antiquity of three thousand two hundred and fifteen years for the statue, it was found that the rate of accretion has been at Memphis about three and a half inches to the century.

Resulting estimate of the antiquity of man in Egypt.

These data furnished Professor Horner the scale of measurement by which various excavations were made in different parts of the valley, in some places to the bottom of the alluvial formation. In one instance a piece of pottery was found, near the base of a statue, at the depth of about thirty-nine feet, which according to the established scale would prove the existence of man and his workmanship in that locality at a date remote from the present by the span of thirteen thousand years. Even this long period does not exhaust the possible habitability of the valley; for the depth at which the relics were found was greatly above the beginning of the alluvial deposits!

In other parts of the world besides the deltas of the two great rivers to which we have referred above, similar investi-



DELTA OF THE NILE.

gations have been carried forward with almost identical results. Sir Charles Lyell transferred his observations to the river Somme, in France, and, after examining the valley and débouchure of that river, came to the conclusion that in that part of the world also the human period extends into the prehistoric ages many thousands of years.

Lyell's investigations in the valley of the Somme.

The argument with respect to the age of the caverns, in the bottoms of which the relics of man-life have been found, is perfectly correlative with that which we have followed respecting the time required to erode the river valleys and

form their deltas and gravel banks. It was only when the rivers began their subsidence from the glacial epoch that the definite arrangement or plan of the present alluvial deposits along their banks and at their mouths was determined; and it was at this very time that the caverns of the calcareous regions were by the recession of the waters left first open and then dry for the occupancy of men and animals. It should be borne in mind, however, that the conclusion of a deposit of human remains in such situations *immediately* after the river floods had ceased to flow in would be unwarranted by the facts, and there is, therefore, a likelihood from this point of view of attributing an exaggerated antiquity to the relics of life discoverable in the caverns. In other respects the argument in favor of the antiquity, that is, of a coïncident antiquity, between the human relics found in the caverns and those discovered in the alluvial deposits of rivers, holds good.

Approximate age of caverns containing human remains.

Attempts have been made in accordance with geological science to discover the approximate age of the relics found in the lake bottoms of Europe, particularly those of Switzerland. Careful investigations have been made at the Pont de Thiele between the lakes of Neufchâtel and Bienne. These two bodies of water are connected by a stream which was formerly an arm reaching from the one lake to the other. The whole valley between the Neufchâtel and the Bienne has been gradually filled and choked up with mud and other deposits under the action of forces which are still at work. The discovery of the remains of so-called lake dwellings in this region and the knowledge of the rate of deposition by which they have been buried away furnish acceptable data for an estimate, not indeed of the first appearance of men in this region, but of the time when the lake dwellers were prevalent.

Estimates of the age of the Swiss lake villages.

It has been found that the old Abbey of St. Jean, built at the close of the eleventh century, has by the filling up around the margin of the lake receded, as it were, from its original situation at the edge of the water by the space of four hundred and six yards. Professor Gillieron, of the College of Neuveville, has applied the ratio thus established to the larger question of the date of the lake dwellings which at this point have receded from the shore a distance of three thousand two hundred and fifty yards, and has thereby determined the minimum antiquity of the ancient lake-shore establishments to be about six thousand seven hundred and fifty years. The reader in considering this calculation must bear in mind the peculiar character of life in the lake dwellings under consideration, and remember that the lake habitations, while they were of a prehistorical character, should not be regarded as the work of the primitive inhabitants of Europe.

Data from which Gillieron's calculation was made.

Another example of geographical evidence may be taken from a similar situation to that last described. Where the small and rapid river Tinniere falls into lake Geneva, a large accumulation of sand and gravel has been made, extending back to prehistoric ages. The deposit is in the form of a cone, which has been opened with a railroad cut and exposed for examination for a distance of about a thousand feet and of more than thirty feet in depth. The rate of formation in this remarkable body of materials has been determined with what is believed to be tolerable accuracy. The

Evidence gathered from the gravel cone of the Tinniere.

RUINS OF LAKE VILLAGE OF MORIGEN, SWITZERLAND—LAID BARE BY SHOALING OF LAKE BIENNE, OCTOBER, 1874.
From a photograph.

remains of man and his workmanship have been found at a depth of as much as nineteen feet from the surface, and careful calculations conducted by the French geologist, M. Morlot, have shown that the period required for the formation of the whole bed has been between seven thousand four hundred and eleven thousand years. The facts and the argument have been reviewed by Sir John Lubbock, who agrees in general with the deductions of M. Morlot.

Another fact which already comes to view in considering these subjects, and which will persist in obtruding itself in many parts of the present work, is the wide-apart situations which have been submitted to geological science, and the consequent wide diffusion of the human race in remote prehistoric times. We are here only concerned directly with the geological evidences of the antiquity of man; but among these evidences we may not forget or neglect the unquestionable indications of the wide distribution of man in the epochs soon succeeding the glacial age. This wide distribution is itself one of the conclusive evidences of great antiquity, and though it does not properly belong to geological testimony, it is so closely connected therewith as to justify a reference to it in this connection.

Deduction from wide-apart situations of primitive races.

On any theory of a common local origin for mankind the immense periods of time necessary for the multiplication and diffusion of the race into continents far distant from one another, and in some instances separated by wide oceans, must be granted at the very beginning. When we see the evidences of common forms of life, including the life of man in common stages of development, in regions remote from each other by the breadth of continents and seas, and almost inaccessible on account of physical barriers interposing themselves to the movements of the first tribes of men, we must be profoundly impressed with the great depth of the chronological perspective, and might well conclude that the lapse of time requisite for the distribution of the first men, whoever they were, from any common point of origin to the respective localities where we find the first evidences of man-life in the matrix of geology, would be as great as all that vast geological period which lies between such earliest evidences of human activity and the present time.

Great period required for the diffusion of mankind.

CHAPTER IV.—ARCHÆOLOGICAL AND PALÆONTOLOGICAL ARGUMENT.

THE relations of archæology to geology have already been indicated in the first chapter of this work. It remains for us in this connection to point out with more care and elaboration the bearings of archæological science on the question of the date of the appearance of mankind on the earth. Archæology may be properly defined—though with seeming paradox of language—as prehistoric history. At first glance the inference might well be drawn that the study of archæology, leading us backward as it does along the positive traces of the human race, would furnish more

satisfactory data relative to the Age of Man than might possibly be derived from the astronomical or geological side of the question. Such, however, is not the fact. While it is true that much more satisfactory and direct evidence may be gained from archæological sources with respect to the mode and limitations of the primitive life of man than can be deduced from geological, or indeed from any other form of inquiry, it is also true that the *chronological* value of archæology rests upon the geological data with which it is associated. As it respects the question of time, therefore, archæology helps and corroborates the estimates and time measurements of the prehistoric ages without furnishing much original and independent testimony thereto.

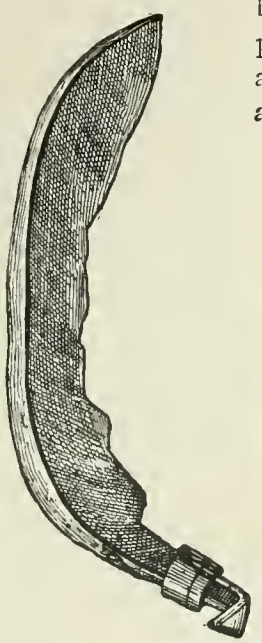
Nature of the testimony to be derived from archæology.

These observations, however, should not lead to the conclusion that archæology—though long impeded in its progress by preconceived opinions—is less scientific in its methods and results than is geology. An examination of the traces and remains of the human race in the long ages before the beginnings of national consciousness furnish excellent materials in proof of the progress, and to some extent the rate of the progress, by which the human race has advanced from its primeval to its present condition; but the proper time measurement comes from the connection which the facts of this science bear to the facts of geology.

Proofs from this source establish the progress of the race.

We shall here refer at once and in an introductory way to the material and subject-matter of archæological inquiry. In the upper parts of the earth's surface the remains of primitive men are found associated with the products of the post-diluvian age in geology. Human bones, especially the harder portions, such as the skulls and teeth, have been laid away by accident or design in localities especially favorable to their preservation. Such remains are associated with rocks and other geological products of known epochs, and are also mixed with the bones of extinct animals, the place of which is known in prehistoric zoölogy. Not only this, but the works of the first men and the secondary races, namely, their implements and utensils, made in many instances of imperishable materials, are plentifully

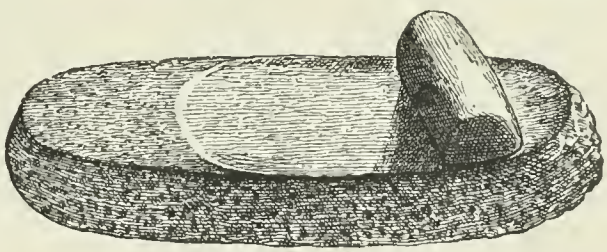
Subject-matter of archæological inquiry.



Iron sickle.

Danish stone saw.

Flint bodkin.



Primitive cornmill of the Stone Age.

ARCHÆOLOGICAL PROOFS OF THE EXISTENCE OF PREHISTORIC MAN.

found in association with the bony remains of the people by whom such implements and tools were devised and used. The materials which primitive men first employed in their rude way in the fabrication of such utensils as their low existence and manner of life called for have remained in the forms originally devised, and indicate most clearly the customs and inartistic methods of the age.

Materials employed by primeval man in making implements.

Nature led the way as to the substance and design of primeval implements. Stone was chosen first, with little modification in the natural or accidental form. At length the evidences of selection of materials appear. The better qualities of stone are chosen. Obsidian and flint become favorable articles of primeval factory. Bone also is used, and the horns of animals in the making of utensils and weapons. At length, with the increase of intelligence and the gift of experience, the metals begin to be taken and employed in the primitive arts. Copper and bronze more and more take the place of the stone utensils and tools which had hitherto been employed. Bronze is succeeded by iron, and the age of war and nationality—the daydawn of the historical epoch—is ushered in.

Time order establishes relative but not absolute dates.

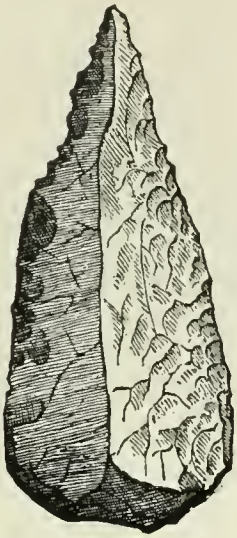
It is thus comparatively easy to determine the sequence of races and times in the prehistoric ages; but this establishment of an order does not by any means give us an absolute date for the various periods of early man history on the earth. The stages through which the race has passed in the evolution of the civilized life from the very lowest and most ancient epoch to times within the limits of authentic history are easily discovered and established by quite indubitable testimony. But at this stage of the inquiry the chronological scale falls into confusion and doubt. The great patent fact is that some races have outstripped others in their rate of progress, so that even to the present day a section of world history presents contemporaneously all stages of development. There are still existent in the world many tribes similar in nearly all respects, except with respect to strength and aggressiveness, to those primeval races which passed away during the formation of the tertiary deposits of the earth's crust.

Existing savagery illustrates the prehistoric state of man.

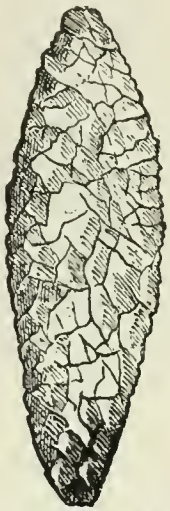
We have only to look abroad into different parts of the world to discover the first men still pursuing methods of life that were prevalent in the times almost immediately succeeding the glacial age. The native inhabitants of Australia, the Maoris of New Zealand, the aboriginal races of other Polynesian islands, the natives of the Greater and Lesser Antilles—such as they were at the time of the discovery of America—and the Red races distributed through the New World from Patagonia to the lands of the Esquimaux, were all, at least until a recent date—as many of them still are—unacquainted with the use of metals in any form. They therefore belong to the age of stone as much as did the barbarians of prehistoric times. It thus becomes impossible, without collateral evidence, to fix the dates of archæological phenomena other than relatively. The relation of such facts may be fixed, but not the time. It is easy to say that certain facts precede others, and to prove that the rate of progress from one stage of development to the next is slow; but it is difficult, if not impracticable, to prove from the existing materials of archæological inquiry *how* ancient or *how* modern they may be.

EIGHT PROGRESSIVE STAGES OF HUMAN DEVELOPMENT, ILLUSTRATED IN FABRICATION AND MATERIALS OF IMPLEMENTS.

(1) Palæolithic awl.

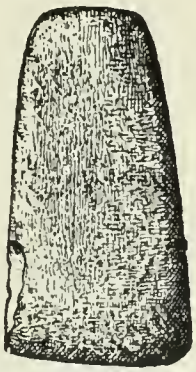


(2) Worked flint.



(3) Chipped spearhead found in a cave of Langerie-Basse.

(4) Half-polished stone ax.



(5) Neolithic hatchet.

(6) Bronze razor of Denmark.

(7) Bronze-handled iron dagger.

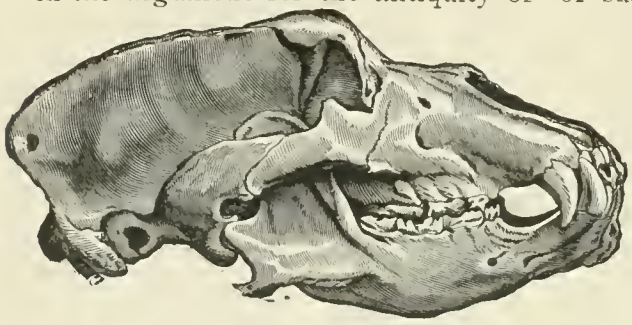
(8) Iron sword.

To this rule, however, there are certain exceptions, principally among the osseous remains of ancient peoples. There are certain types of structure unmistakably belonging to remote antiquity. The surviving barbarous races do not possess those strongly marked animal characteristics by which the aggressive barbarians of remote antiquity were characterized. It would appear that the more peaceable, less warlike, less adventurous, less progressive tribes and races of the ancient world have in one sense outlived the stronger and more ferocious of the primitive peoples. The latter seem to have survived in a civilized posterity, while the former have preserved their ancient proclivities with little evolution or change. It is for these reasons that certain kinds of human remains may be judged from their own nature to have belonged to far-remote primitive races; but the general fact remains that those implements and weapons, by which the Age of Stone is easily discriminated from the Age of Bronze, and the latter from

Differences between surviving and extinct barbarians.

the Age of Iron, are comparatively useless in determining the absolute dates of prehistoric times.

Another flaw—but of opposite import—in the argument for the antiquity of man from archæological remains is found in the reliance, sometimes too implicitly placed, on the association of human bones and implements with the remains of extinct animals. It should be remembered that the present distribution of animals over the earth, particularly of the carnivora, has been largely effected and limited by the agency of man himself. The lion, the tiger, the hyena, *et id omne genus*, can not coëxist in the same country with civilization. Not indeed, as is generally supposed, on account of the climate, but specifically because when the man and the tiger are in the same arena the one or the other must go to the wall. It has been generally assumed that the great extinct cave bear, the cave lion, and the cave hyena, whose remains are found associated with those of primitive men, must have belonged to a period very remote from the glacial age in Europe—either before or after—since the climate of that epoch, when the ice-cover of the European countries generally abutted southward against the Alps and the Pyrenees, would be too rigorous for the existence of animals now confined to Africa and the Asiatic jungles.



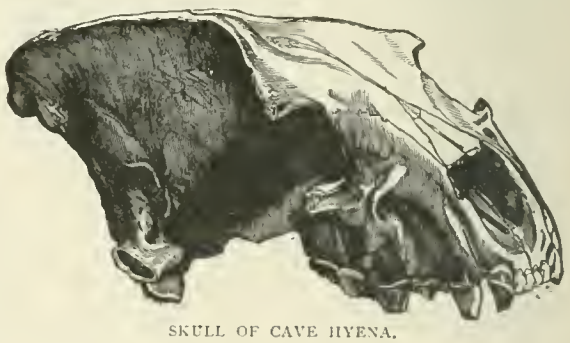
SKULL OF CAVE BEAR.

Mistaken deductions respecting association of remains.

This conclusion, however, is to forget that the tiger, the bear, the hyena, and even the lion are, to the present time, fully capable of sustaining a degree of cold approaching that of the arctic circle, and that these creatures have receded into their present habitat, not because of its tropical character, but for the reason that civilization has driven them back into those fastnesses where an abundance of vegetable-eating animals furnish subsistence for the carnivora. In prehistoric Europe, therefore, there was no reason for the nonexistence of these savage beasts close along the line of the receding glaciers. At the present time the Indian tiger, where the wall of civilization is not around him, breaks freely from his jungle, pursuing the antelope and the deer up the slopes of the Himalayas to the line of perpetual snow; while the leopard, the panther, and the cheetah stop not even for the snow, but follow their prey into the fastnesses of Siberia.

Ferocious beasts not wholly of tropical habitat.

For these reasons we may perceive clearly the fallacy in the argument of those who would reduce the date of the first men by claiming that the association of their bones, even in the most primitive localities, is with the relics of animals which, though extinct, must



SKULL OF CAVE HYENA.

have existed at a period long subsequent to the glacial age.

Direct evidence deducible from archæological data.

There are, however, some direct evidences of the antiquity of archæological remains; that is, evidences in the remains themselves. By common consent the stone age marks the first stage in the human evolution. Now stone, when it is worked by the human hand, or when broken or abraded by accident, presents a new surface to the action of the elements, and this surface bears witness ever afterwards to the antiquity or the recency of the fracture. All kinds of stone, even the hardest and most carefully polished, show after the lapse of years that the surface so exposed is growing old. The granite shafts preserved from ancient Egypt proclaim even to the unscholarly observer their manifest and indubitable antiquity. The glint of all varieties of broken or polished stonework disappears at length, and is replaced with a dulled and hoary surface, the difference between which and any recently polished or broken exposure is intensified by a microscopic examination. These facts hold whether the specimen or monument in question has been exposed only to the aërial elements or whether it has been buried in the earth.

Stone implements witness to the age of their production.

To all persons the difference between an ancient and recently fabricated stone implement is apparent, but most apparent to the archæologist. To his practiced eye every stony surface tells the story of its antiquity—not, indeed, with absolute certainty as to date, but approximately as to epoch. It is easy to arrange and classify the palæolithic specimens of a collection by the degree of the secular erosion of their surfaces, to arrange the most ancient in a group by themselves, and to fix with some approximation to accuracy the age of each.

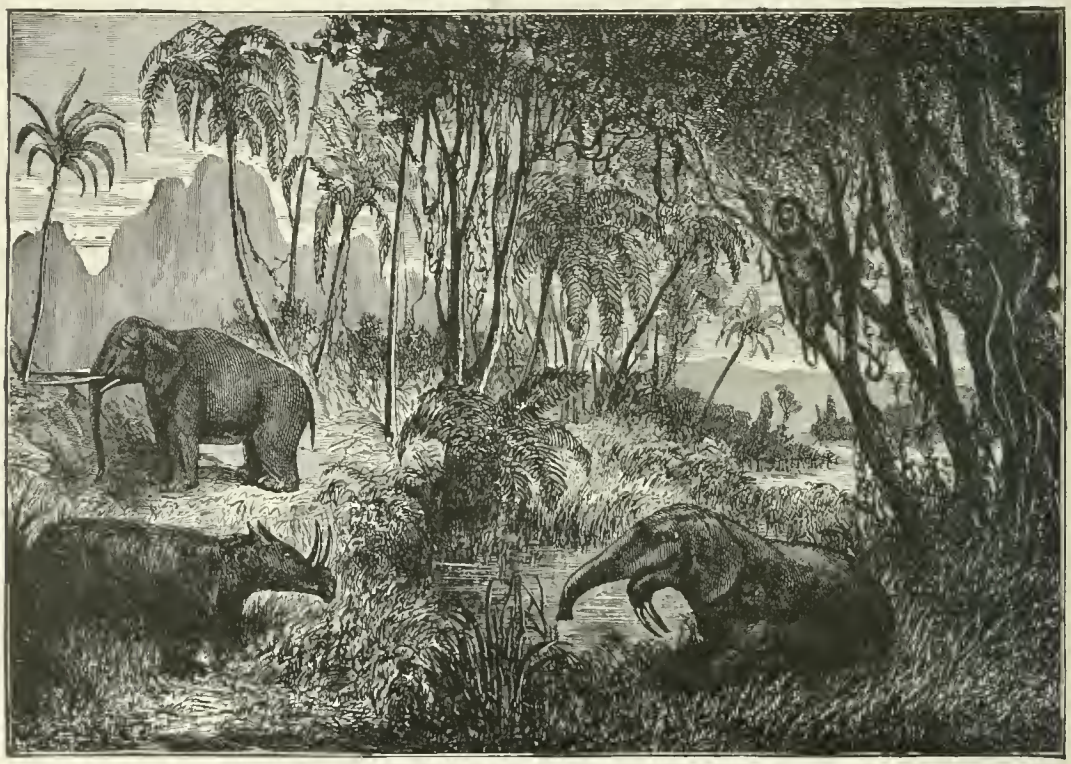
Place and character of the most ancient human remains.

It is by the means here suggested that archæologists have determined with tolerable certainty what are the most ancient remains of human industry yet discovered in Europe. In a deposit near Thenay, in Central France, certain implements of flint have been recovered which are regarded as the workmanship of the first men. The specimens in question are rather larger than the majority of such finds, and were produced by primary and secondary chippings. Competent geologists have assigned to these rough relics of primitive handicraft a date coïncident with the middle of the tertiary period. Of equal age are some relics which have been taken from the old bed of the river Tagus, near Lisbon. The French archæologists, and in particular M. Ribeiro, who made the discovery, are strongly of the opinion that the relics in question are of the middle tertiary, and that nothing more ancient of the workmanship of man has been found anywhere in the earth's crust. Even in this case, however, science is constrained to fall back upon the situation and surroundings in making an estimate of the true date of the implements referred to. Archæology, pure and simple, is able to say no more than this, that the articles in question were made by a tool-using animal acquainted with the use of fire; that they are, by the evidence of their own surfaces, of a very remote period in the prehistoric ages, and that the coïncident geological proof points to the borders of the miocene epoch as the date of their production.

It should be understood by the reader in his effort to grasp the remoteness of the probable period at which these most

aboriginal implements were produced that the gap in time and skill and progress between such finds and the next in order is very great. It would seem indeed that the period reaching from the age of these most archaïc relics to the age of the finely executed flint arrowheads and spearheads which we may see in almost any museum of natural history, was fully as extensive as that reaching from the age of the arrowpoints to the age of iron.

Immense time-gap between successive archæological ages.



LANDSCAPE OF THE MIOCENE—BORDERLAND OF MAN.—Drawn by Riou.

This consideration, indeed, brings us again to the use and application of right reason to the problem before us. The ancient implements which we are here considering mark the first departure of human intelligence from that of the lower animals. The rude artisanship of the articles in question advances but a stage above the skill and cunning of the anthropoid apes. The latter have been known to break a club from the branch of a tree and to set the weapon in a place where it might be found again; then to use it a second time—all this, however, without direct adaptation of the weapon to the object of its use. In the case of the stone implements of the earliest age, we find them, as a rule, prepared on one side only. The first men seemed to have sought such fragments of stone as had been partly shaped by the accident of nature. This fact would reduce the amount of labor and skill which the aborigines must employ in preparing the other side of the block. Perhaps a majority of the most ancient forms are characterized by human workmanship on one side only, the other remaining as it was produced in the more ancient shop of nature.

Intelligence of the first men compared with that of animals.

The span from such art as this to that

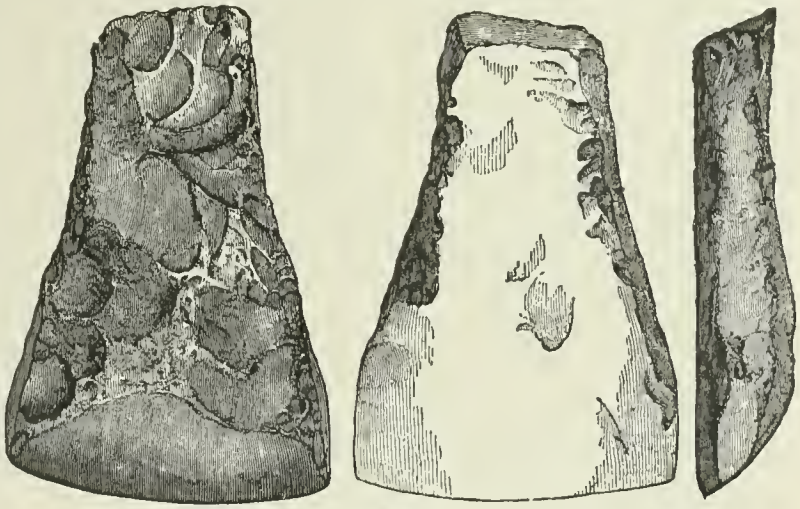
of a symmetrical arrowpoint is very great. It is not, however, such a stage of progress as might not be rapidly passed in an age of progress and amelioration. Modern society very frequently sees such transitions accomplished in a few decades; but not so in the primitive world. In that it would appear that the aboriginal savages were unable to lift themselves to new methods of life except after great travail and eons of time. We have only to glance at a few facts in order to find indubitable proofs of the truth of this hypothesis.

Stride from lowest to secondary stages of artisanship.

One of the most significant of these facts is the wide distribution of implements of the kind referred to above. It is definitely known that the race of beings by which they were used was not at all restricted to France and England —in which countries archæological inquiry has been prosecuted with greatest success. On the contrary, such archaïc implements have been found in regions of the world widely separated by mountains, rivers, and seas. Relics of like character have been discovered in the Rhone gravel near Arles, and in the Po and Vibrata, and as far south as Rome. Others of identical character have been recovered on the banks of the Meuse and the Scheldt, and still others in Central Germany. Farther abroad, even in the sands of the African rivers, and more frequently in the river-beds of North America, such relics have been discovered. Professor Henry W. Haynes, of Boston, has taken implements of like sort out of the sands of the Nile. Such specimens have been found forty feet below the surface in the diamond fields of the Cape of Good Hope, and still others in a deposit near Madras, India, and still others in Japan.

Wide distribution of palæolithic implements.

We thus see the unmistakably wide distribution of primitive men established by archæological evidences. But if we look closely at the situation in which the most ancient stone relics of human workmanship have been found, we shall see that everywhere the situation is alike. The rivers were chosen as the nesting places of the aborigines; and there they clung. No specimens of ancient stone weapons or implements of the most archaïc type have been found in Switzerland, or any other countries greatly elevated, or in regions far removed from river banks. This would seem to establish several facts: First, that the date at which the primeval races here under consideration flourished was as far back as the time when the mountains and highlands were still covered with the glacial deposits.



EXAMPLES OF OLD STONE WORKMANSHIP—ADZES OF NEW ZEALAND.

Common situation of the most primitive tribes; deductions.

Secondly, we note that the geological condition was such everywhere as to invite the gathering of the primitive savages in the warmer spots near the estuaries of rivers, on those grounds where the ice had melted away and from which the waters had receded. Thirdly, we infer that these first races of human beings were sedentary; that is, that they were locally fixed to their places of habitation, from which they wandered forth for no purpose but to procure the means of subsistence. Fourthly, we may justly deduce the conclusion of the exceedingly unprogressive character of the tribes referred to. They were virtually without ideas or thought. In such an age and from such a beginning the human evolution proceeds most slowly, and it is probable—almost certain—that many thousands of years were consumed in this winter of the human race before it began to grow, to break the soil of environment, to rise into the air and light of intelligence and progress.

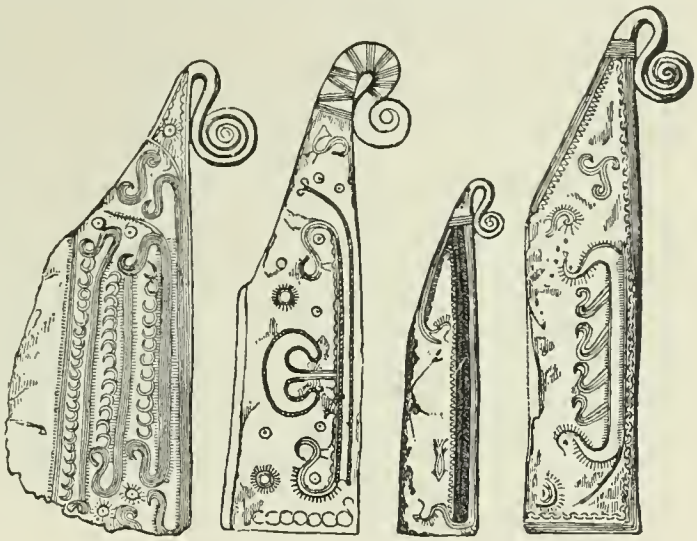
EXAMPLES OF NEW STONE WORKMANSHIP—HATCHETS OF YUCATAN.
Drawn by Eugene Meunier.

Still another consideration may here be properly adduced, and that is the negative argument as to the condition and consequent remote date of the Old Stone Age. We may learn from the things *not* found that the epoch in question was almost inconceivably remote from the present. None of the implements belonging thereto seem to have been devised for the purpose of skinning beasts, preparing hides, or manufacturing clothing; from which it is probable that the artificial protection of the body by means of garments had not yet been discovered. It is claimed that no evidences of burial or other reverential or superstitious care of the dead bodies of the people have been found among the relics of this age. Nor has any trace of religious ceremony, as evidenced by charm or amulet, been discovered in association with the rude weaponry of this most ancient period of human existence. It is claimed, however, that certain shells prepared for personal adornment have been found associated with implements of the earliest age; from which the inference is drawn that the earliest æsthetic ideas of mankind were those relating to the decoration and adornment of the body—a hopeful sign, and most hopeful in the savages.

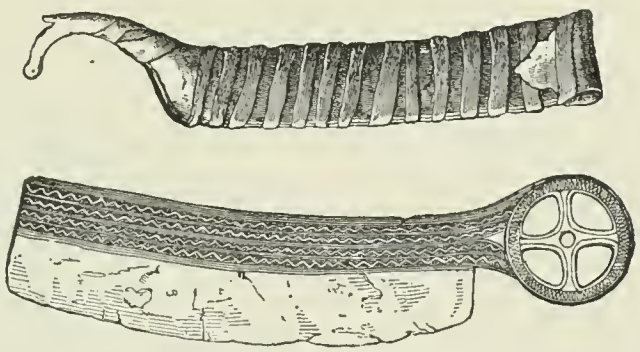
Negative proofs of low condition of man in the Old Stone Age.

After the Old Stone age a change appears not only in the implements and weapons of the ancestors of mankind, but, what is far more significant, in the makers also. Ideas and thought appear. Talent begins to be. There are evidences of reflection, studied purpose, and design. Already in the New Stone epoch we discover the beginnings of progress and taste. The implements of this age are polished, fashioned, finished. They have, at least by suggestion, the rudiments of artistic form. The men who made them could conceive a pattern and follow it, and—if that—could imagine. Further on, in the age of bronze, the mental faculties are displayed in still higher activity. Some of the relics of this age are positively elegant. Design reaches as far as ornamentation and real art. Actual genius is displayed, even though it be in the carving of a knife-blade or the decoration of a razor.

Evidences of development furnished by archæological relics.



Razors from Denmark.



Small knives from Denmark.

EXAMPLES OF PREHISTORIC WORKMANSHIP, FROM BRØNZE AGE.

It is not needed in this connection to follow the lines of progress downward from the most primitive ages, since our only purpose in these chapters is to approximate the date of the beginning of the career of man. The testimony of archæology taken altogether is entirely corroborative of that drawn from astronomical sources and of the evidences gained by geological study. Indeed, the whole web of proof holds together, and presents a unity of structure which could hardly have been expected considering the recent date of the physical sciences and the still imperfect knowledge which men have gained respecting the former conditions of the earth and its inhabitants.

Archæological testimony corroborates the other sciences.

If we turn, in the next place, to palæontology, we shall find the same corroboration in proof, and virtually the same examples in illustration. It is the peculiarity of the study before us that, beginning from an astronomical basis and working our way downward through many branches of investigation to common tradition and history, the successive subjects seem to anticipate one another

Palæontology a branch of archæological inquiry.

in their results. Geological inquiry includes as one of its departments archæology, and archæology in like manner embraces palæontology. We can not investigate the evidences of man-life in the earth by an examination of the implements, weapons, utensils, adornments, primitive architecture, etc., without finding constantly in the path of the inquiry the subject-matter of palæontology. But without pursuing these reflections, let us look at once at the testimony afforded in the fossiliferous history of the earth relative to the date of man's appearance.

HUGE ANIMALS PRECEDING THE AGE OF MAN.
(1) Megatherium, restored.

A glance at the present aspect of the world shows us as the two most conspicuous facts of the landscape the vegetable and animal forms of life prevalent on the surface or in the air and waters. A very casual examination of these flora and fauna reveals to us the fact that they are in a state of transformation. The changes going on in the forms of life, whether vegetable or animal, are slow and orderly; but the fact of change is as certain as the fact of existence. There is not a vital phenomenon of any kind on the face of the earth which does not reveal under scrutiny this law of transformation. The individuals of a given species come and go by the processes of procreation, growth, maturity, decline, and death; and the species themselves, to which these individuals belong, though of far greater duration, are in a process of change exactly analogous to that of the individual parts.

Transformation the law of vegetable and animal forms.

HUGE ANIMALS PRECEDING THE AGE OF MAN.
(2) Dinotherium.

Existing orders the residue of extinct types of being.

Some species of vegetable and animal life are already old; others are young; some are middle-aged. If we begin an examination of the most recent superficial deposits of the earth, we find therein what may be called the back history of many existing orders of life. But we do not pursue the investigation far until we arrive at unmistakable evidences of other forms of preëxisting life that are now extinct. Following these preëxisting forms through their fossiliferous history downward, we are able with care to discover in the correlations of geology the whole career of these extinct orders —to find their beginnings, their middles, and their ends.

Older forms give place to new in a fixed order of life.

But meanwhile, as we continue our exploration of the crust of the earth, we come to still other and older varieties of life which are no longer to be found in existing species, or even in the more superficial parts of the earth's crust. Still onward and downward we make our way, with results always analogous to those discovered at the first. We are soon able to generalize and to say that the whole history of life is a history of cycles, succeeding each other from the azoïc ages of our planetary history to the present day. An Order of Life is thus established, consisting of many varieties and forms through rising scales of development, the older ever dying away, the newer ever surviving, through the whole extent of world duration.

This order of life, with its great cycles and successions, when once it has been established, is as invariable as the geological epochs and transformations with which it is so intimately associated. The life history of the globe comes at length to be as well fixed and as invariable as the geological annals of the globe.

Motions of the evolutionary process among living forms.

It is from this point of view that we are able to discover the superior value of palæontological inquiry as it bears on the question of the antiquity of man. We have seen, in a former part, that archaïc implements and other relics of human workmanship surviving from prehistoric times do not easily establish the antiquity of the races by which they were produced—this, for the reason that we have at the present time the age of stone coëxisting with the age of iron. But the extinct forms of life never coexist with the current forms. The order of living being, whether in the vegetable or the animal kingdom, is absolute. The newer race, the higher type, succeeds the older—the lower; from which it happens that the age of a given fossil, having been once determined by its correlation with some geological epoch, becomes ever afterwards a means and measure by which the antiquity of associated facts may be determined.

Order of animal existence as fixed as geological order.

Thus we have in prehistoric chronology the Age of the Great Cave Bear succeeding the Age of the Mammoth, the Age of the Mammoth that of the Reindeer, and the Age of the Reindeer that of Domestic Animals. This order holding good in Central Europe, where it was first discovered as a law of zoölogical succession, may be depended upon with almost as much certainty as the order of the geological formations of the earth's crust. We should as little expect to find the remains of a mammoth succeeding the remains of a reindeer in a given country as we should expect to find a pliocene stratum under a chalk bed—unless, indeed, there had been in the latter case a physical cataclysm to produce the inversion.

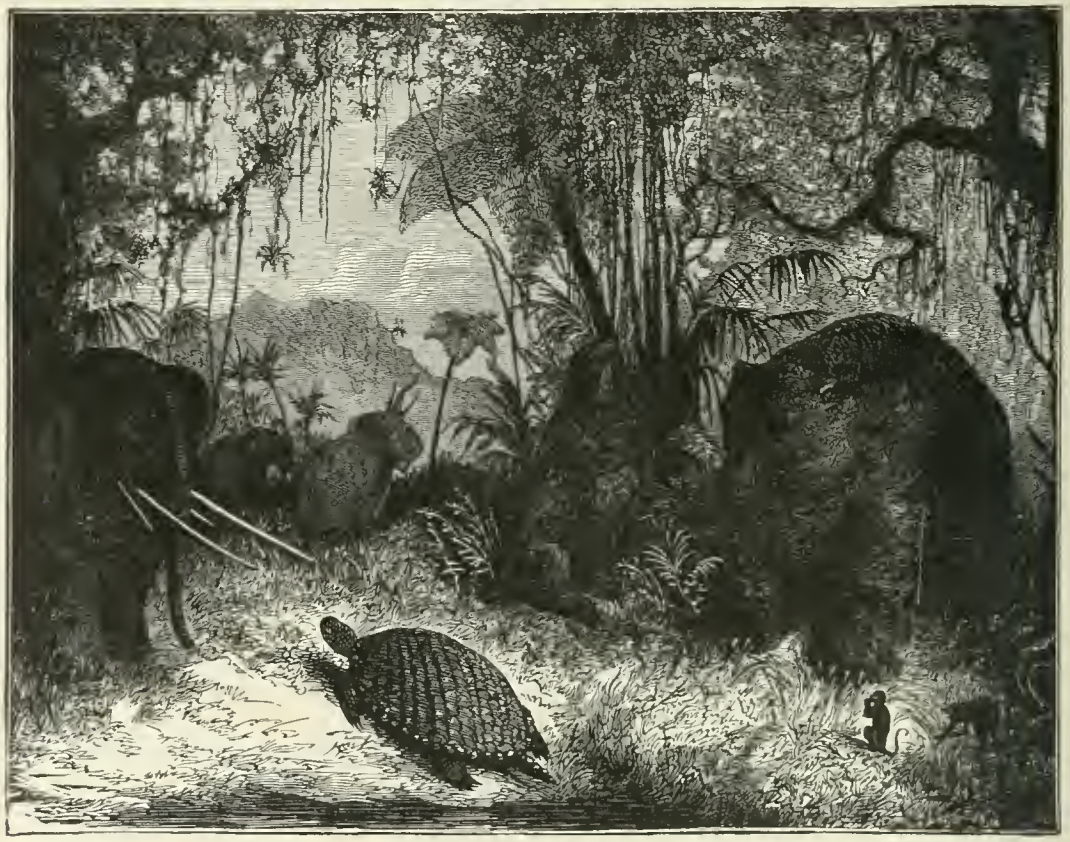
This established order in the animal

world has been of vast use in determining the date of human phenomena in the prehistoric ages. Man has always been closely associated with the other forms of animal existence. Being to some extent carnivorous in his habits—and much more so in the barbarous than in the civilized condition—he has from

Man-life closely linked with the history of animal species.

we have many additional facts that are of great value and essential interest drawn from the history of the fauna of the world. One of these is the law of diminishing size and power which holds generally of the different species of wild animals and inversely of the domestic animals. Many of the beasts which in-

Wild animals diminish in size in successive eras.



Elephas primigenius. Glyptodon. Cave bear.

ANIMALS ASSOCIATED WITH PRIMEVAL MAN.—Drawn by Riou.

his most primitive condition relied to a very great degree upon the associated orders of life for his means of subsistence. We are not here to dwell upon these facts save sufficiently to show the usefulness of animal remains in determining the unknown dates of human history.

Besides the established order of animated nature, from the first appearance of life on the earth to the present day, habited the earth coïncidently with the first men were of prodigious size. We have already referred by name to several of the huge carnivora at one time prevailing in Europe and America. One of these was the tremendous cave bear, another the cave lion, another the cave hyena. In general, these creatures were of the genus Felis. Besides these there were vegetable-eating animals, also huge and powerful. To this order belonged

the gigantic Megaceros Hibernicus, or Irish Elk. There was also the Rhinoceros tichorinus, or Wall-nosed rhinoceros, with his two horns and woolly body; likewise the Hippopotamus major, vastly greater in bulk and more savage in habits than the descendent variety still wallowing in the mud of the Nile.

All of these animals, carnivora and other, were greatly larger and stronger than any living representatives of their respective kinds. The great pachyderms, most prodigious of all the warm-blooded animals that have inhabited the earth, declined in proportion as they tended toward extinction, and the same process continues to the present day, except in those species which have been reduced to domestication by man. Wherever the last-named process has been effected the law of bulk and power has been reversed. The tremendous horses which we now find patiently serving man in all the civilized countries are the descendants of the prehistoric *hiparion elegans* of palæontology. There are to-day larger dogs, larger sheep, and larger swine in the world than ever before; and if the cattle do not surpass in size the primeval ox, they do exceed in weight and strength any of the varieties from which they are nearly or even mediately descended.

The law reversed in the case of domesticated animals.

These two laws, the one expressing the rate of decline in the size and capacities of the wild animals of the earth, and the other the inverted law of increased bulk and power of animals under domestication, become the data which the inquirer may use in generalizing with respect to the antiquity of man. The coëxistence of the human race with the animals mentioned by name in the above paragraphs is now a fact so well established that it is no longer in controversy, at least among scientific men. The question, therefore, as to the antiquity of man resolves itself into the question of the antiquity of the prehistoric animals that were his coïnhabitants of the earth in prehistoric ages. The question of the antiquity of these animals resolves itself, in turn, into the question of the age of the world when they were the prevailing forms; that is, the latter question is partly so resolved. For, as we have seen above, there are some principles by which the age of a given form of animal life may be approximately determined even without reference to the geological conditions under which the remains of such animals are discovered. But for the most part the decision of the question goes back, as before, to the date of that post-glacial epoch in geology at which the extinct animals referred to and primeval man existed together. In a word, the geological date is the determinative factor in the greater part of the inquiry, while the corroborative elements of the argument are derived from archæology and palæontology.

Antiquity of man determinable by sequence of species.

CHAPTER V.—THE ETHNOLOGICAL ARGUMENT.

WE have thus by progressive stages already impinged on the domain of that recent branch of science called anthropology. The scope and limitations of this department of inquiry have already been defined in the first chapter of this work. The science in question has one division, namely, the human division, of palæontology as its first part, while in its after development it divides naturally into ethnology and ethnography. For our present purpose it is sufficient to say that anthropology throws at least some reflected light on the question of the antiquity of man. Take, for example, the longevity of the individual of our species as a hint on the longevity of the race of beings to which we belong. There is undoubtedly a correlation between the brief life of ephemeral and transient living forms and the rapid transformation of that variety of life to which they belong. Man is without question one of the most long-lived animals inhabiting the earth; and the supposition of great duration, past, present, and future, for the human race, is in accordance with right reason and scientific deductions.

Anthropology bears witness to the antiquity of man.

In the anatomical structure, in the physiological offices of man there are evidences of the profound antiquity of the race. In many parts of the human body there remain from the prehistoric state the rudimentary forms and indications of organs which, as organs, no longer exist in our species. These rudimentary parts in every case stand for actual organs in some other varieties of animal life, thus indicating most positively, as the evolutionist believes, the ultimate kinship and successive differentiation of all forms of living beings on the earth. It is by no means our purpose in this part of the inquiry to consider the validity of the hypothesis of evolution; but it may well be urged in this connection that, from whatever point of view we consider the descent of man, the existence in the human body of rudimentary parts points, as we think unmistakably, to a very high antiquity for the human species.

Existence of atrophied organs in the body.

Consider for a moment the existence and significance of rudimentary organs in the body. Under the eyelids of every human being are found the outlines, and indeed the fact, of a semilunar fold corresponding precisely to the nictitating membrane in the eyes of the domestic fowl or the goose. Here in the human anatomy is the potential representation and simulacrum of an organ which must, in the nature of the case, answer to some function or use in the present, the future, or the past. The semilunar fold in the eyelid has no use in the present. It is against the laws of right reason to suppose that it will ever have a use in the future, since the means of protection to the eye will increase rather than diminish with the further evolution of human life; and at the same time the dangers to which the organ is subject will be correspondingly diminished. We must therefore conclude that the rudimentary part represents an organ which once had an office to perform for the benefit of the organism as a whole. With the

Such organs signify a preëxisting mode of life.

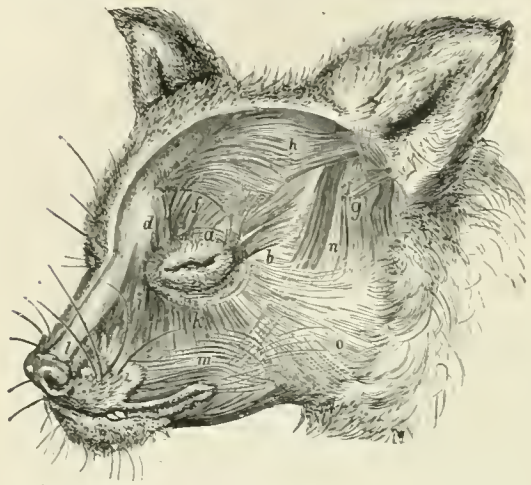
gradual amelioration of conditions and with the physiological improvement of the eyelids proper, the necessity for such an organ as the nictitating membrane gradually ceased, and with disuse came feebleness of function, reduction of size, and final atrophy. This would appear to be the only possible explanation of the presence of such a rudimentary part as the semilunar fold in an animal such as man.

The very same thing may be said of those other structural elements in the human body which no longer serve a purpose. What that purpose would be under certain conditions we are able to see by a glance at the anatomy and physiology of other animals. It is no longer useful to human beings, having as they do the free use of the arm and hand, to possess a muscle for moving the ears, though such a muscle in the lower animals is highly important and beneficial. But the muscle, though in an atrophied or semiatrophied condition, still exists in man, and in some instances the possessor is still able by the will to move the ear in a manner which must have been common and convenient for the species in some remote prehistoric epoch. The same thing may be said of the appendix vermiformis and of several other parts of the human body for which no plausible explanation has ever been offered *except* that they stand for organs and offices that were once in full exercise and development by the ancestors of our

EXAMPLE OF EXTREME LONGEVITY—AN EASTERN SORCERESS.
Drawn by G. Vuillier.

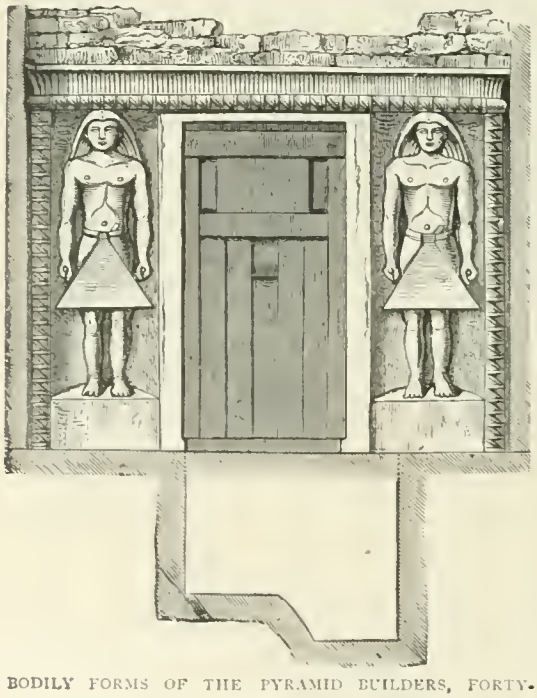
Atrophied ear-muscles and extinct mammæ in man.

race, but have fallen into desuetude through ages of changing conditions and



DOG'S HEAD, SHOWING MUSCLES FOR MOVING THE EAR WHICH HAVE BECOME ATROPHIED, THROUGH DISUSE, IN MAN.

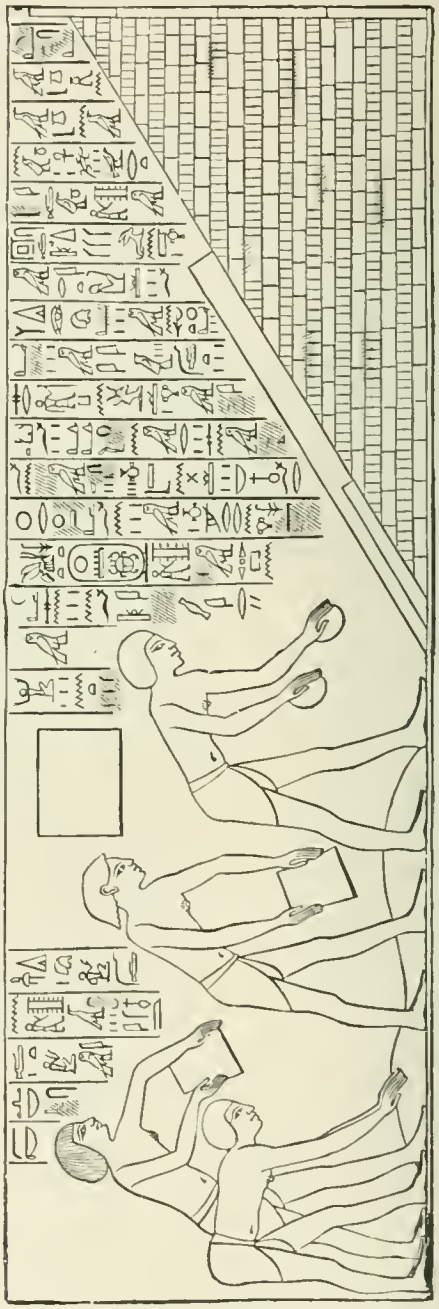
the altered necessities of life. Aye, more than this, we have in the human anatomy certain parts, such as the rudi-



BODILY FORMS OF THE PYRAMID BUILDERS, FORTY-THREE CENTURIES FROM THE PRESENT.
Drawn by B. Strassberger, from door of tomb at Gizeh.

mentary breasts of the male, which seem to point to a condition still more primitive in the development of our race—to a time when even the sexes had not been differentiated the one from the other!

As we said above, these facts, and the



BODILY FORMS OF THE PYRAMID BUILDERS, THIRTY-FOUR CENTURIES FROM THE PRESENT.
Drawn by Wiedenbach, from sculptures of prisoners of war, time of Thothmes III.

conclusions toward which they tend in support of the hypothesis of evolution, are not adduced in this connection as an evidence of the truth of that theory, but

simply to illustrate the testimony which anthropology is able to give respecting the antiquity of man. For how vast must have been the time requisite for producing such astounding changes as have manifestly taken place in the organs and functions of the human body! Consider for a moment the backward look which we are able to give to the condition of mankind by the single light of history. It is hardly an exaggeration to refer to consecutive facts in the annals of Egypt as far away as three thousand years before the Christian era; yet among the most ancient works of that primitive seat of civilization we are able to discover unmistakably the presence of the man-form already differentiated into ethnic varieties and present aspects of activity. We have no reason to suppose that the rudimentary organs of the pyramid builders were any larger, more vital, more active, than they are in the race to-day. This is to say that the work of evolution—or whatever it was—by which the atrophied condition of certain organs which had fallen into disuse had already been completed five thousand years ago! What, therefore, shall we say of the lapse of time necessary to have effected the transformation? What shall we say of the almost inconceivable period in human development requisite for the differentiation of the sexes in all hot-blooded animals, the evidence of which has been transmitted in rudimentary organs still existing in the males in a condition of atrophy after at least five thousand years?

Vast reach of time requisite to produce anatomical changes.

Anthropology parts into at least two kinds of inquiry of the greatest importance. These are ethnography and ethnology. According to Jean Reclus these two departments of human knowledge "run up into anthropology, as anthropology does into zoölogy, and zoölogy into biology." It is true, how-

Relations of ethnology and ethnography to other sciences.

ETHNIC DIFFERENTIATION.—(1) MARIA OF COS—EUROPEAN TYPE.
Drawn by E. Ronjat, from a photograph.

ever, that the line of demarkation between ethnographic and ethnological investigation is difficult to draw, just as the division between geography and geology is faint and in some parts undiscoverable. In fact, ethnography, ethnology, and anthropology hold fast in their subject-matter and methods to philology, jurisprudence, archæology, geography, and even to tradition and history.

ETHNIC DIFFERENTIATION.—(2) THE "BLACK FLAGS" OF SOUTHERN CHINA—ASIATIC TYPES.
Drawn by Barbotin, from a photograph.

The present work, devoted to a history of the great races of mankind, must, in the nature of the case, be essentially ethnographic and ethnological in its subjects and manner of treatment; but we are not by any means at this juncture to branch out into the treatise at large. Our present purpose is no more than to note in a general way the light and testimony of ethnology and ethnography respecting the question of the antiquity of man.

Ethnology here considered as indicating the antiquity of man.

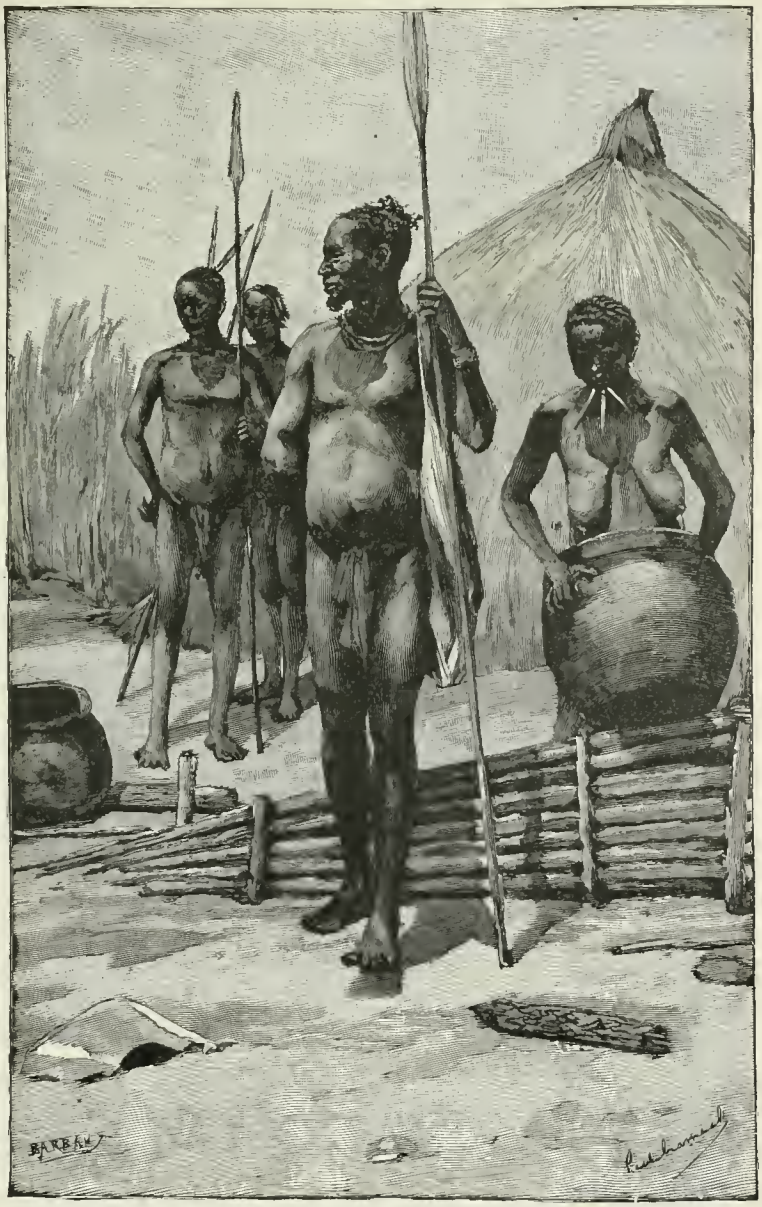
Let us mark then, first of all, the dispersion of the human race into tribes and kindreds. The traveler abroad, going from country to country, visiting one people after another, is perhaps more impressed with their *differences* in ethnic characteristics, in manners and customs and language and law, than he is with their *identities*. The distribution of mankind is literally from the rivers to the ends of the earth, and their differences range through a wide scale of departure covering almost all possible variations in physical, intellectual, and moral character.

When—at what time in the past—did these ethnic peculiarities appear? As a preliminary to answering this question we may confidently assert that they *did not appear all at once;* that is, the ethnic marks and peculiarities by which the various tribes and kindreds of mankind are so strongly discriminated, did not appear phenomenally; but only

Ethnic differences already well developed in the dawn.

mediately, and by imperceptible degrees. Of one thing we are historically certain, and that is that the distinguishing traits of the different peoples of the earth were already strongly and deeply drawn in the daydawn of human annals, and that since the remotest epoch of tradition they have scarcely been so much as emphasized by increasing differentiation. Indeed, it is unmistakably true that in modern times at least the strong, deep-cut lines of demarkation by which races and peoples were aforetime distinguished the one from the other are, to a considerable degree, effaced and obliterated by the ebb and flow of civilization; so that on the whole the tribes and nations of antiquity—the most remote antiquity — were, by much, more clearly discriminated than they are at the present time.

It is trite to refer to the historical evidence which abounds respecting the truth of these statements. The monuments of ancient Egypt and Assyria, if none other existed, would of themselves suffice to establish the early differentiation of mankind. Among the former sculptures we find positively delineated at least four leading types of men as they exist to-day; and the lines are drawn with as much distinctness as though they had been executed by an ethnographer in the last decade of the nineteenth century! Thus at the epoch of the pyramid builders the races of Europe, Asia, and Africa had already been confirmed for all time in their ethnical characteristics.



ETHNIC DIFFERENTIATION.—(3) CHIEF YABANDA AND FAMILY, OF THE CONGO—AFRICAN TYPES.
Drawn by Madame Paule Crampel, after a sketch of Nebout.

Evidences of the early evolution of race distinctions.

These facts established, as they are, right reason demands the acceptance of one of several possible inferences. The first of these is that the races of men, as they come into view in the early dawn of history, had descended through a remote prehistoric past from a common origin, and that in the long processes of that descent the ethnic characteristics of each race and people had been developed and established. Another supposition possible in the case is that men began from various parts of the earth, under various conditions, and from different originals. From these the descending lines of ethnic life were drawn under the influences of environment, until at length, in the morning of tradition, the various peoples emerged into view with their respective characteristics fixed as we find them at the present day. A third view is that which presupposes phenomenal departures from a common type at some period in the prehistoric ages. This hypothesis includes a supposed anomalous divergence; as, for instance, in a common family in which the sons, though born of one father and one mother, should come into the world with different ethnic traits upon them, thus establishing, or rather opening, the fountain heads of races and peoples. The suppositions may be multiplied, but the foregoing are sufficient to indicate the possibilities of the case.

Several theories to account for the differentiation of the races.

It is almost needless for a writer of the present day—strongly indoctrinated as the age is with the principles of science, a knowledge of causation and universal sequence—to assert that only one, namely, the first, of the above suppositions is tenable. It is not our purpose in this place to discuss the monogenetic and polygenetic theories of the origin of the human race. From what we know, however, of the orderly evolution of life, there is only one rational and thoroughly consistent view of the history of the ethnic distinctions existing among mankind, and that is that in a period far remote, beyond the beginning of human annals and extending to a great depth in the prehistoric ages, mankind, of a given type, appeared on the earth, and that in the vicissitudes of the ages following, far below the remotest rim of historical knowledge, the tribes of primitive men gradually, almost imperceptibly, diverged from the common type, taking new features and new dispositions under the conditions in which they found themselves by migration, dispersion, and the contingency of climate. How slowly these forces operate in producing the changes which have manifestly been effected among the peoples of the earth is well known to all who have investigated the subject, and those who have never done so may easily apprehend the almost inconceivable lapses of time necessary to effect such changes.

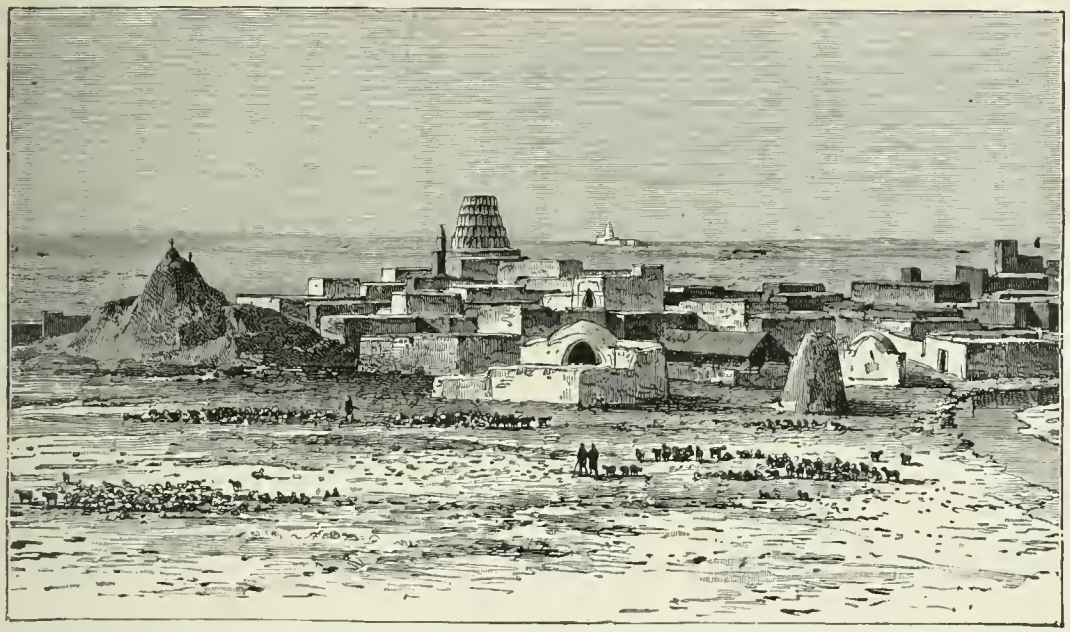
Acceptance of monogenesis and influence of environment.

The problem has in it a sort of mathematical basis — an ethnic calculus — suggestive at least of the immense distance at which, from the ethnological point of view, the origin of the human race must be placed. As was intimated in a foregoing paragraph, we have what are no doubt exact representations of the different race-types at a period nearly five thousand years ago. From these, and by comparison with descendent forms, we may, as it were, compute the rate of ethnic change in the human species. It is noticeable in doing so that the rate is more rapid under civilization than in barbarism—a fact the reverse of what might have been anticipated. The Negro physiognomy as

Deduction of great antiquity from early race departures.

depicted in the Egyptian sculptures is almost identical with that of to-day; but the Copt of modern Egypt, affected as he has been by so many historical influences, has diverged not a little from the parent Egyptian type. The modern Greek and the modern Italian are discriminable by many ethnic marks from the great Greek of the ancient world and the Roman original; but the wild men of the Asiatic steppes, and no doubt the aborigines of the American continent, kind had been evolved and established as they have ever since remained, how far off must have been the beginnings of the process! If we should say that a lapse of time equal to five times the whole distance from the beginning of human annals to the present day should be allowed for the ethnic divergence of the prehistoric races, we should certainly not exaggerate the probabilities of the case. That many thousands of years

Probable estimate of the duration of prehistoric ages.



VALLEY OF THE EUPHRATES—ONE OF THE PRIMITIVE SEATS OF MANKIND.
Drawn by Taylor, from a photograph by Madame Dieulafoy.

have changed but little in form and feature during several milleniums. This law of the more rapid change of ethnic characteristics under the civilized life tends to lengthen, rather than abbreviate, the duration of that prehistoric period in which the ethnic peculiarities of the various peoples were evolved and fixed.

If, therefore, as much as five thousand years ago, when the civilized life had certainly and strongly asserted itself in the valley of the Nile and had probably appeared in the valleys of the Indus and the Euphrates, the ethnic traits of man- were required for such a transformation of peoples and kindreds as had already taken place before tradition and history began to record the words and deeds of men, can hardly be doubted by any one who has taken an enlarged view of the subject.

Not only has the prehistoric divergence in ethnic traits established the great antiquity of man, but the testimony derived from this source has been corroborated by the fact of the wide distribution of the primitive peoples of the earth. Within the historical period only a few

places, and these for the most part islands, have been found which were not already occupied by human beings at the time of discovery. Some of the West India islands were uninhabited at the close of the fifteenth century. The same circumstance has been noted in Polynesia. But as a general fact the world has all been inhabited, even from antiquity. More than this: the first comers, even thousands of years ago, invariably found the countries into which they made their eruptions already peopled by an earlier race. It may readily be granted that the old Aryans themselves, before the dawn of history, making their way westward, found no uninhabited regions. As far back as we are able to reach by historical record and tradition, we note the same condition—the same invariable circumstance of the universal occupancy of the world by men.

Time required for distribution corroborates the estimate.

The fact of this early diffusion of the human race over the earth tends strongly to establish the great antiquity of the race. This view of the situation in prehistoric times is intensified when we take into consideration the difficulties which confronted the first men in making their way from place to place. Great were the barriers and obstacles which constantly interposed themselves to the movements of primitive mankind. The common idea of tribal migration is almost wholly erroneous. True, there were times and peculiar conditions under which primitive peoples moved out from their old seats and in a phenomenal manner made their way across the prehistoric landscape into new countries, new islands, and even new continents. But, on the whole, the distribution of mankind over the earth has not been effected by *migration*, but by *diffusion*. The race has diffused itself, like the slow growth of a vine creeping over the surface at a rate so small that it can not be detected by the senses. Only after a lapse of time are we able to see that the vine has taken a new and advanced position. In like manner the first men spread over the surface of the earth by gradual diffusion. Whenever a really favorable situation was reached by the outlying members of the tribe, then there would be a movement somewhat more rapid in that direction, until the better place so discovered was peopled and dispossessed of its native treasures.

Subjective and objective hindrances to diffusion of races.

By right reason we are able to see the spreading volume of the human race in the prehistoric ages. The advance of the frontier line in every given direction would be like the current of Cæsar's river, "so slow that by the natural eye the direction of the current could not be determined." What we are here concerned to note is the great period of time requisite for the distribution of the primitive peoples over the earth and the consequent high antiquity of the race. The process or processes, for instance, by which a population was finally contributed to the islands of the Pacific and to the American continents must have been so tedious, so much retarded by the opposing conditions of the natural world, so greatly heightened by the barbaric state of the primitive tribes by which the work was accomplished, so long held back by pauses and retrogressions as to demand for the accomplishment what may well be estimated not at a hundred or a thousand years, but at an eon of time.

Slow movement of the frontier line in race distribution.

Certain facts must constantly be borne in mind which by their nature must have long retarded the distribution of the original races over the earth.

The work was effected in some way before the dawn of civilization. This signifies that men in a state of nature inhabited a natural world, little modified as yet by the influence of its inhabitants. It is almost impossible for men under the civilized life to realize the difficulty which a primeval people, a real aboriginal tribe, would experience in attempting so simple a feat as crossing a river. We may suppose that the aboriginal man could swim; but the transportation of children across a broad and rapid stream must have been to the men of the first epoch an almost impossible task. No doubt the introduction of boats and rafts was an event belonging to a very early age in the human evolution. Nevertheless, there was a time when primeval savages worked their way up slowly, cautiously, distrustfully to the concept of a canoe with as much difficulty, aye, much greater difficulty, than the modern man has experienced in the idea and construction of the ocean steamer. Indeed, every advance which marked the slow progress of mankind in the prehistoric ages was attended with such labor and doubt and tedious approaches of attempt and failure as must have retarded for almost immemorial ages the coming of primitive civilization. All calculations respecting the antiquity of man, which do not include among the prominent elements of the problem these facts respecting the difficulties interposed by nature to the diffusion of the first races over the earth, are inadequate and erroneous in their bottom principles.

Particular obstacles to be surmounted in migration of races.

In all the primeval world there was not a single highway. Nature builds no roads, constructs no bridges. We must remember in this connection that in all that vast and warlike world revealed to us in the history of Egypt and India and Greece and Carthage and Rome there was not a single tunnel. The aqueduct, the viaduct, the sewer, even the Cloaca Maxima, were known at a very early age; and the building abilities of the people were able to have produced a tunnel in the proper sense; but it remained not for the age of Alexander or Cæsar or the Antonies, not for the epoch of Justinian or the era of Charlemagne, not for the Renaissance or the times of Napoleon, but for the nineteenth century to construct the first underground passageway for the movements of civilization—the quick transit of men and merchandise.

Absence of means of communication in primeval ages.

PROGRESS OF PRIMEVAL MAN BY WATER.

We have already referred more than once to the tremendous obstacle of the seas and oceans. With what a sense of impotency must the primitive man have come to the seashore! Even after the age of boats and ships, how did he cling to the shores and inlets of the seemingly infinite deep! It must be remembered

that the concept of the impassibility of the sea and even of lakes and rivers was one of those ideas which in the early ages of the world became fixed by the law of heredity—transmitted from generation to generation, until it was a part of the intellectual and even the religious belief of the primitive peoples. No science but history—and history not well—is able to estimate at its full value the retarding and paralyzing effect of hereditary beliefs upon even the physical, to say nothing of the intellectual and moral, progress of mankind. Not infrequently we find the forward march utterly impeded and a given people held absolutely to their last camping ground for a thousand years by a single hereditary thought driven down like their tent pins through the belief and practice of that kindred.

Check offered to ethnic progress by seas and oceans.

The significance of these facts and principles is their powerful bearing on the rate of diffusion by which the earth was peopled with the aboriginal races; the slowness of the progress by which from valley to valley, from river to river, through untrodden forests, from shore to shore, and finally from continent to continent, the aborigines of the world at last made their way into its more favorable and favoring parts; the vast, almost immeasurable, periods of duration that must have elapsed between the beginning and the end of the distribution of the human race, and the consequent remoteness of the date which must be assigned for the appearance of man on the earth.

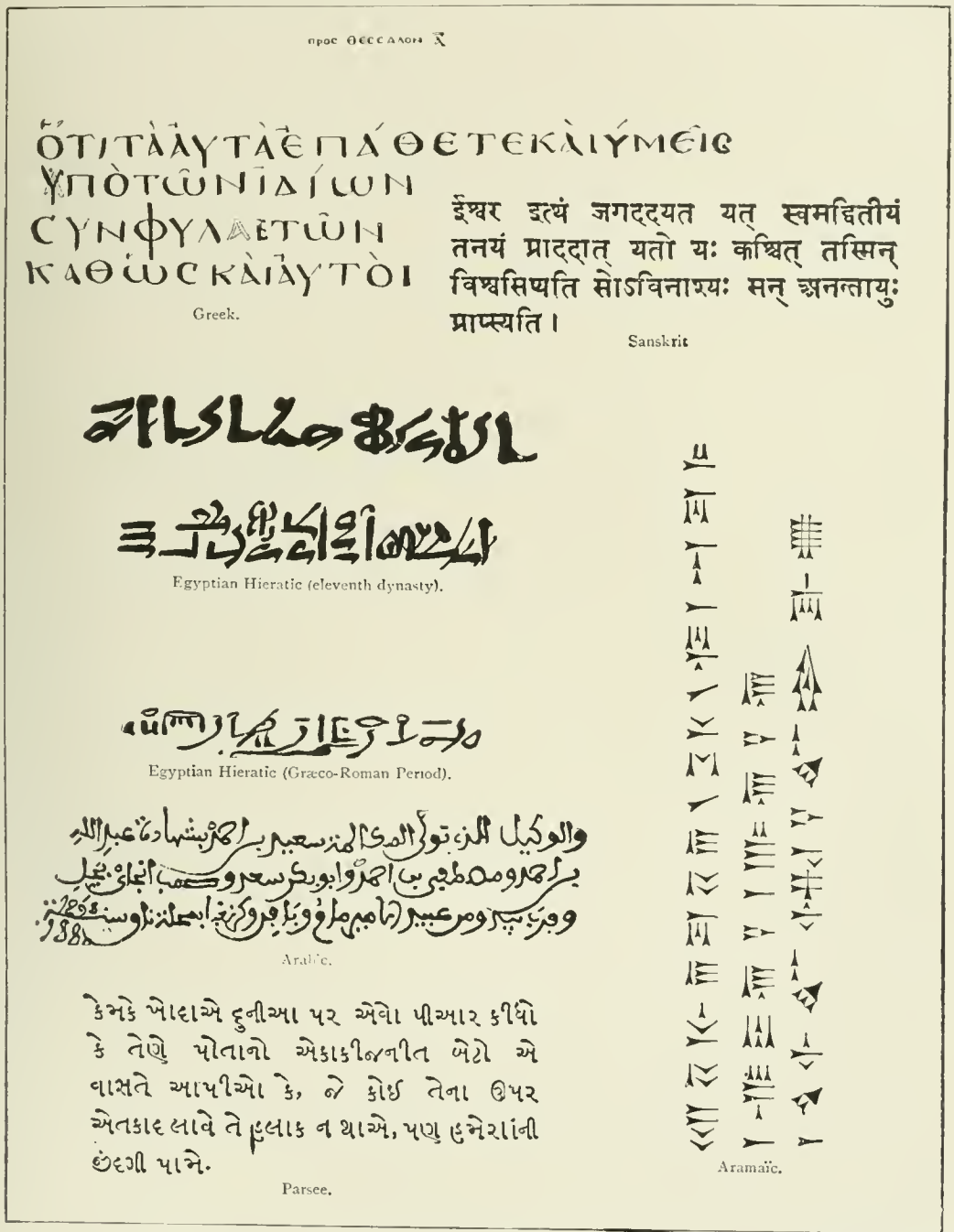
Rate of race diffusion to be estimated from obstacles thereto.

THE AGE OF BOATS.—Earliest Navigators, of Neolithic Epoch.

Every part of the problem tends to establish the same conclusion. Perhaps the most striking attribute of man is his faculty of speech. Language is his. Philology as a science has risen, as a branch of anthropological study, to

Division and development of languages require great time.

explain and interpret the significance of linguistic phenomena. It is not our purpose in this connection to review the history of language, or to discuss the varieties of form in which it has appeared, and the correlations existing among the varieties of human speech. We desire to refer to the subject only in corroboration of the conclusions which have been already deduced from other kinds of knowledge.



DIFFERENTIATION OF LANGUAGES ILLUSTRATED IN ANCIENT STYLES OF WRITINGS.

Each ethnic branch of the human race

has its own form of language. Among the peoples who compose a given family of mankind there is generally a common speech with dialectical differences. These differences sometimes become so well marked and firmly fixed as to constitute independent languages. This process of linguistic differentiation requires *time* as one of the conditions of its accomplishment. As a rule, the rate of change, even in the alteration of an accent, is slow, and the larger transformations are even more difficult to be accomplished. Human language passes through changes and modifications under the law of evolution just as the mind does, which requires speech as one of its functions. In the case of peoples intellectually active, and as yet not restricted by the set forms of literary expression, linguistic mutation is more rapid; but among barbarians and conservative races marked with little activity of thought speech continues in set forms for long periods of duration.

Time a condition of the creation of dialects and languages.

The division of mankind into families and races has been largely determined by means of language. Some of the differences by which one family of languages is discriminated from another are very deep and ineradicable. The forms of speech by which the Semitic peoples are distinguished are fundamentally different from the forms employed by the Aryan races, and these in their turn are radically of another type from those employed by the Turanians. The very root-forms of the Semitic languages, so called, are unknown in the Indo-Europic tongues. It has been claimed by philologists that not more than ten common radicals exist in the Aryan and Semitic vocabularies. Even the few cases of identity may doubtless be explained by reasons other than linguistic affinity.

Linguistic differences deep and ineradicable.

The same utter dissimilarity exists in the grammar of the two families of speech referred to. There are no common features in the sentential structure and composition of the two types of language. The development of the speech-forms of the two seems to have been by the law of contraries; insomuch that the student of a Semitic language must transpose his very methods of thought and abandon all of his preconceptions and principles of analogy before he can enter the spirit of the strange linguistic structure before him. The student who has mastered Latin and French may take up Spanish and find so much that is common to what he has already learned, so much that is in analogy with all his preconceptions and knowledge, that his task is as easy as to go to the same city by a slightly divergent route; but not so in the acquirement of Hebrew or Arabic.

Utter dissimilarity of Semitic and Aryan forms of speech.

What we are here concerned to note, however, is that the profound structural differences between the great divisions of human speech must have required long periods of time for their production. How long these periods have been to effect the given result it were but conjecture to estimate. The problem is exactly analogous to that presented by the dispersion of races. There has been a dispersion of speech. Whether it is possible, indeed, to refer all languages to a common point of departure is matter of dispute among linguists of the highest authority. The attempt to derive Hebrew and German from a single original is, to say the least, beset with as many difficulties as confronts the ethnologist in his effort to trace an Anglo-

Such structural differences require great periods of time.

American to the same stock with an aboriginal Australian. All that we are at liberty, in face of the facts, to say is that it may be done; and in such a hypothesis, whether for the different races themselves or for the languages which they speak, we are encouraged by the results thus far attained in philology and ethnology, nearly all of which tend to support the belief in the monogenetic origin of mankind and a common original for all human speech.

If languages be of common origin time must be greater.

The great significance, therefore, of all that we have been able to learn with respect to the languages of the world is that *if* they are of a common derivation, then the lapse of time required for the production of their several forms must have been very great. At the daydawn of history human speech had already been deflected into forms even more variant than those at the present existing. At that epoch the inflectional languages were in full efflorescence. The Sanskrit and the Greek presented examples of completeness in structural development for which the student of language must search in vain among the current tongues. Already at that most remote date, on the easternmost shores of the Mediterranean, a Semitic language had perfected itself into that perfect triliteral rigidity which we see in the sacred books of the Hebrews. In a word, the linguistic types were as far apart and as well established in that remote morning of civilized life as they are to-day. The whole divergence between them had been effected before the Hebrew as a Hebrew and the Greek as a Greek had made their appearance in the remotest dawn of tradition and story.

Ages demanded for production of Hebrew and Greek from a common stem.

This period of divergence must have been of great duration indeed. The conditions of the case are such as to force us to believe that the prehistoric age or ages in which the Greek and the Hebrew—as examples for all others—were parted from a common linguistic original must have been so great as to place the date of the origin far beyond the puny calculations which were accepted aforetime as not only probable but authentic. Even beyond this imaginary point of departure for the two languages from a common linguistic original we are obliged to look still further and take into account the vast structure and derivation of the Oriental tongues. In doing so, geographical difficulties have to be overcome. The high mountains of Asia must be surpassed and vast ethnical obstacles removed before we can combine the line of the Mongolian languages with that of the races of Western Asia and Europe. In other words, the same profound perspective is here required as in the case of the dispersion of races and of the geological history of primeval man. It is as difficult to reach a common original for all existing linguistic forms as it is to find a common ancestry for the cave dwellers of Western Europe, the native Australians, the blubber-eating Esquimaux, and the flint-chipping barbarians of Polynesia.

CHAPTER VI.—HISTORY AND TRADITION.

AS we approach the present, through the various branches of inquiry which have occupied our attention, we come at length to History and Tradition. If the first of these were complete, or the other trustworthy, we might walk with more confidence through the shadowland of the past. We are constrained, however, to take history as it is, with all its incompleteness and tradition, with all its crudity, contradictions, and inflections, and to gain therefrom whatever we may respecting the date of the appearance of man on the earth. In the first place, history as an oracle is silent on this subject; but this is no more than what we should expect. Indeed, if the historian, without the light reflected from other fields of inquiry, should attempt to fix a calendar for the prehistoric ages, he would at once denounce himself to the thinkers of all posterity. History is a product of the conscious and reflective life of man —of that civilized life upon which the race enters *after* it has reached the stage of a high human evolution. What, therefore, shall history be able to record about the unconscious life of the race extending below the horizon of the past, and impossible of approach by any backward exploration?

Why history can not testify directly of the beginning.

In the first chapter of this work we have attempted to define what history is, and to show its limitations. There have been two clearly distinct views and practices in the composition of historical narrative. There was an ancient type, and there is a new type. The first was pictorial, descriptive; the other is expository and sociological. The first proceeded no further than men and the deeds of men; the second reaches through all the individual aspects of human life, and through the deeds which men have seemed to accomplish, to the event, to the cause of the event, and to the great social evolution of which the event is but the temporary expression.

Two distinct types of historical composition.

The ancient history aimed at a perfect style and form of narrative, at dignity of language and eloquent deductions from the lives and actions of men. It was far more concerned about the turning of a period than about the accuracy of the research and the authenticity of the data which it employed. In the new history we might say that there is little concern about the form and expression, but an infinity of painstaking with respect to the materials of the narrative and an ever-increasing interest in those lines of causation by which all events are held together in a single great event constituting the totality of human life. It is almost needless to add that the new history is a creation of the present century, and that by its method and spirit and the significance of its results it is destined to relegate all the previous historical labors of mankind to the place of the *materials* of history rather than history itself.

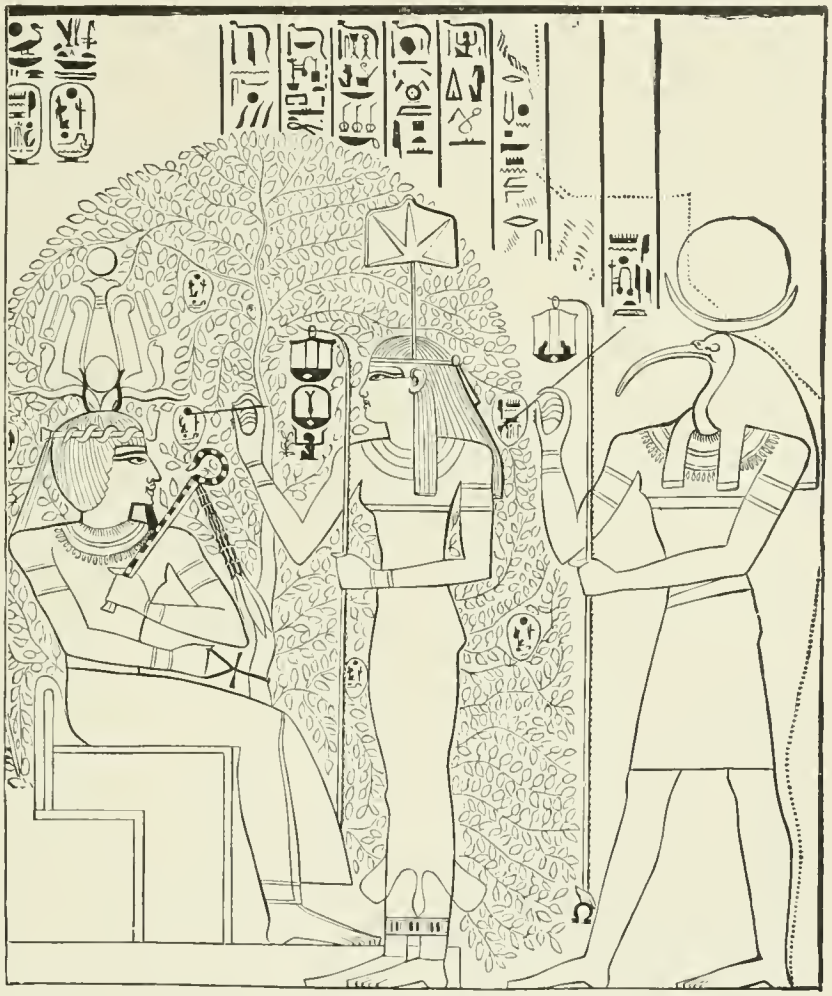
Spirit and aim of the old history and the new.

We must, however, in an inquiry like the present, freely and gladly accept all historical productions as of value and importance. This is particularly true of the products of the early ages, as they lie so much nearer than the present to

The present inquiry makes free use of all materials.

the beginnings of civilization and the first conscious life of the race. They express at least the concepts, beliefs, and philosophy of the greatest minds of antiquity. They reveal to us, without intentional effort to do so, many aspects of the societies which rose and flourished around the Mediterranean. In some there is an attempt to revive in the historical garb the myth and tradition of the prehistoric ages, and thus to acquaint the reader with the movements of mankind before the dawn.

History, as a species of composition, was invented by the Greeks in the fifth century before the Christian era. To that age belong Herodotus, Thucydides, and Xenophon. Ctesias, Philistus, Theopompus, and Ephorus came afterwards, each with his particular merits and blemishes, and with an evident decline from their greater predecessors. With the spread of Roman power and the conversion of Hellas into a province, the seat of culture was transplanted to the Tiber; but the products of the Roman muses were never equal in spirit and art to the works of the Greek masters. From the Græco-Italic fountains literature, including history as one of its branches, flowed down and mingled with the intellectual life of all the peoples of Western Europe, and finally with that of the New World. It is only within the eighteenth and nineteenth centuries that the models of the classical ages have been to a certain extent put aside and the scientific type of composition substituted in their stead.



THOTH AND SAFEKH (GODDESS OF HISTORY) WRITING THE DEEDS OF RAMSES II.
Drawn by B. Strassberger.

Rise and dissemination of history in Europe and America.

It is possible, even probable, that a better acquaintance with Chinese literature and with that of India will put us into possession of historical works of a

more ancient date than those of Greece; but the question is still an open one in the hands of explorers and Oriental scholars. Not so, however, with the sacred books of the East. These have in many parts at least a semihistorical character. Perhaps none of them were produced with the true historical intent. The annals and chronicles which we find among the literary remains of the East Indian races, the Mesopotamian nations, the Egyptians, and the Hebrews in particular, were not formulated by the ancient seers and scribes with a view to the preservation of an authentic narrative of events, but with the ulterior purpose of furnishing a mold and matrix in which the religious history and polity of the respective peoples should be expressed, established, and perpetuated. Nevertheless, historical narratives of this secondary kind have a great value as a source of information respecting the early progress of the race.

Possible opening of new historical vistas in the East.

The oldest works of the kind referred to, belonging to the literature of the Aryan race, are the sacred books of the Brahmans, the principal of which are known collectively by the name of the Vedas. This work, like the Hebrew Bible, is made up of parts which were produced at successive intervals of time, extending in the aggregate over a great period of duration. The oldest of the Vedas has been assigned to the era between the twenty-first and the nineteenth century B. C. While the work in question is by no means historical in its design, it contains not a little historical matter, and may thus be accepted as the earliest existent hint of the condition of society among the Aryan peoples at a distance of twenty centuries beyond the Christian era.

Old historical documents of the Aryan races.

Among the Hamitic races still more ancient records have been preserved. The condition of literature (even historical literature) at the time of the visit of Herodotus to Egypt was of a kind to impress that forerunner of European history with a sense of remote antiquity such as the modern inquirer experiences in examining the oldest Greek manuscripts in existence. The records of ancient Egypt, whether engraved on granite shafts and the walls of palaces and tombs, or written on sheets of papyrus, are undoubtedly the oldest *contemporary* documents in the possession of mankind—unless future researches into the literature of China should bring to light others still more ancient.

Hamites precede all others in contemporary documents.

The antiquity of the writings composing the Scriptures of the Hebrews has never been definitely determined; but they are known to antedate the writings of Herodotus, if not the poems of Homer. It was about the eighth century B. C. that the prophets and scribes of Israel began to reduce their oral utterances to the fixed form of manuscript. Writing, however, already existed among the Hebrews and other Semitic peoples long before this date. In the time of Josiah, reigning at the middle of the seventh century B. C., a Book of the Law was discovered, containing, as is believed, Deuteronomy and some other fragments of more ancient composition, and these were used by the king and the hierarchy in a religious reformation of the people. It was not, however, until after the times of the Babylonian captivity of the Jews that most of the sacred books of Israel were composed, approximately in their present forms.

Time and place of the Hebrew historical books.

Behind all the writings, historical and semihistorical, poetical, mythical, and

prophetic, to which reference has been made in the preceding pages, lies the age of tradition. Certain it is that human thought and speech long precede the fact of written records. There was a period in the history of mankind when the imagination of the more highly developed peoples ran riot through all the forms of fiction and mythology. The beliefs, hopes, longings, purposes, and doubtless the dreams of the primitive races issued from a thousand fountains and combined their products in a volume of oral tradition. The lore of one age was handed down to the next, sometimes in its integrity, and sometimes greatly modified and inflected by the additions made thereto by subsequent myth-makers and story-tellers.

Tradition precedes, but mingles with, beginnings of history.

We must remember constantly the difference between history and tradition. The first rests, however remote the subject-matter may be, on the testimony of witnesses contemporary with the facts described; the latter reposes on the testimony of those who were removed in time or place, or both, from the circumstances and events constituting the subject-matter of the story. History transcribes directly from the eyewitness, the earwitness, of the event, or from the manuscripts and sculptures made by them; while tradition repeats a narrative which has been transmitted from tongue to tongue, transformed through all the uncertainties of memory and speech, and delivered to the fixedness of literary form only after the lapse of generations.[1]

Difference between traditional lore and history.

It will be seen at a glance that history, as determinative of the dates of past events, has in it two elements of value. The first and greatest of these is present in those historical writings or sculptures which record the contemporary event *at the time* and *under the conditions of its occurrence*. Of this kind are such writings as the *Commentaries* of Julius Cæsar, who used neither tradition nor documents, but recorded only the facts of his own observation and experience in the Gallic War. To the same class belong a part of the writings of Josephus. Many European warriors and diplomats have recorded the history of their epochs in books of memoirs, most instructive to after times. The last half of the nineteenth century has witnessed the composition of much historical narrative by the participants in such great events as the Civil War in the United States. It is needless to emphasize the superiority of historical narrative composed on this plan to every other form of recorded annals. The second element of value and authenticity is found in those writings which, though not written by participants in the events described, are based exclusively upon documents and evidences which were contemporaneous with the

What constitutes highest and secondary authenticity.

[1] A good example of the historical tradition is furnished in the story of Atlantis as given by Plato. When Solon was a traveler in Egypt, near the beginning of the sixth century B. C., the priest of Saïs, pretending to a profounder lore of the past than was possessed by any other cult, told him that in former ages the Athenians had been great in war. In that remote time the men of the great kingdom Atlantis, beyond the pillars of Hercules, had made war on Europe and had finally been driven back by the Hellenes. Solon, on his return to Greece, told the story to his friend Critias, and the latter, in his old age, recited it to his grandson, also named Critias. The grandson became a member, in his mature life, about a hundred years after the times of Solon, of the Socratic group, and to the members of that unequaled club he told one day what his grandfather had heard from Solon. Plato afterwards took the story up, and in the dialogue of *Timæus* reduced it to literary form. The world is much concerned to know how much credence may be given to the tradition of Atlantis and other such famous narratives handed down from the primitive ages.

event and as far as practicable a part thereof.[1]

No contemporaneous history of the time of the beginning.

We may now attempt to apply certain principles and deductions to the question of the antiquity of man as determined by historical and traditional evidence. In the first place, history in the primary intent is, out of the nature of the case, wholly silent. Nobody *saw* the advent of mankind on the earth. The first men did not themselves record that event on stone or parchment. No memorial or monument exists which bears remotely on the apparition of mankind on the earth. No diligence of antiquarian research has ever been rewarded, or can ever be, with the faintest trace of an original authority, that is, of contemporary evidence, respecting the rise of the human race. The case stands precisely as might be anticipated by the light of right reason. No man remembers his own origin. No child notes its coming into the world by making a record of the event for posterity. To suppose as much is to suppose the impossible. For how could the unconscious being make a record of its own advent? How could primitive man, unacquainted with the arts, a stranger to the desire of historical fame, wholly concerned with the material wants of life and the instinct of reproduction, be expected to create memorials of his coming in a record which would presuppose reflection, ambition, forethought, and the desire of renown with posterity?

We must not, therefore, expect to find any satisfactory evidence in history at first hand relative to the date of man's appearance. This is equivalent to saying, also, that history in its second form, that is, that kind of historical narrative which is derived from original contemporaneous documents, inscriptions, and monumental remains, is likewise silent about the time of the beginning. The first men were, as we have said above, involved in labors far different from that of producing monuments and preparing parchments for the interest and instruction of after ages. The very same reason which precludes the possibility of the first man's having recorded for himself the time of his coming, by monument or tablet, precludes also the possibility of the discovery of contemporary evidences by the story-teller or historian of after times. Why should an antiquarian search for that which is not? Why should the archæologist hope to find an inscription which, should he find it, would be the best possible proof that it did *not* bear witness to the beginning? Why hope that some contemporaneous monument will be found with a record of an age which neither built monuments nor desired to be remembered?

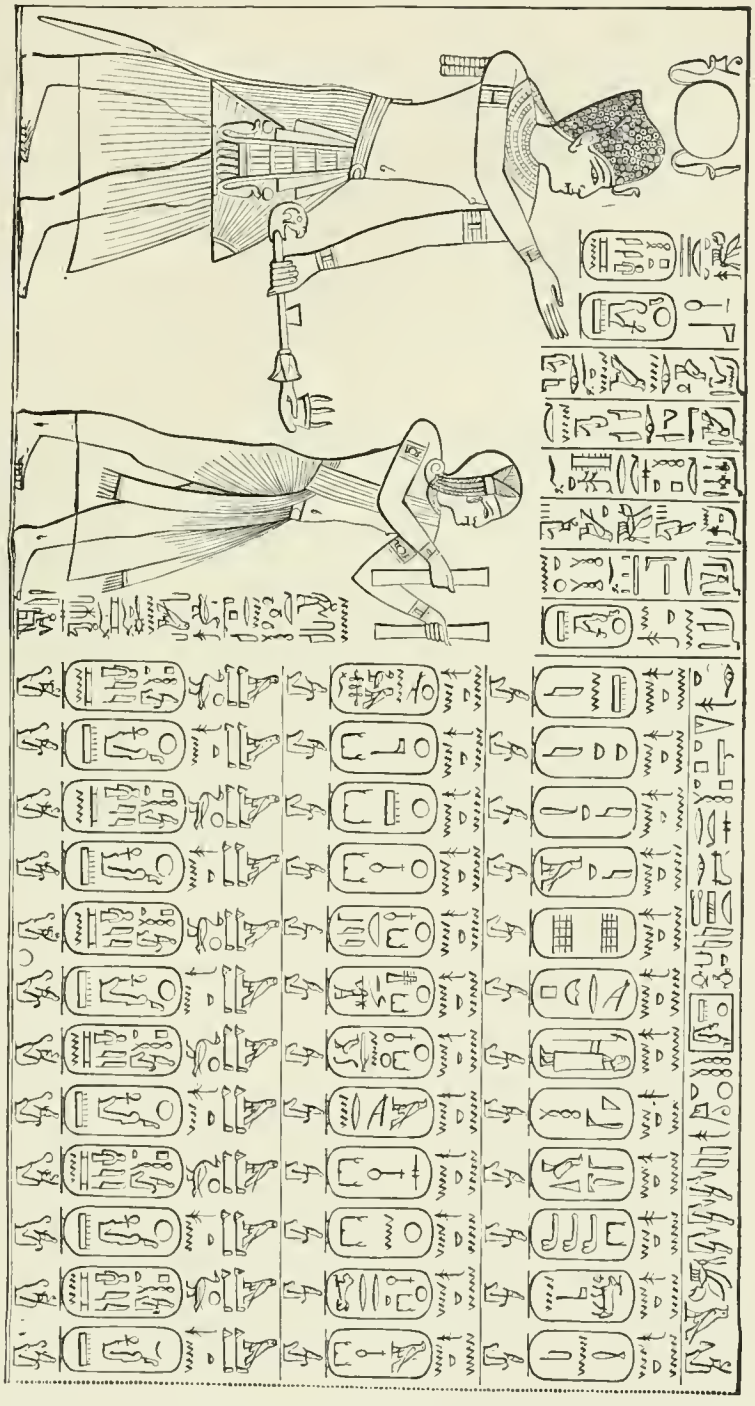
History from contemporaneous data also impossible.

While it is true that history in its first and second forms and also in its primitive elements, in poem and sacred book and rhapsody and prophetic oracle, can bear no *direct* evidence respecting the antiquity of man, there is a collateral inference drawn therefrom of considerable importance. This is found in the fact that the first writings in narrative form, or tending to that form, are found at very early stages in the histories of great peoples widely separated in place and already developed into different aspects of ethnic life. We may accept it as true that writings of this kind existed

Important deductions from earliest historical records.

[1] The first great example of a history conforming throughout to this lofty standard of authenticity was Gibbon's *Decline and Fall of the Roman Empire*, which, according to the author's own testimony, was deduced throughout from documents contemporary with the events; nothing was taken at second hand.

among the Chinese as much as fifteen centuries before our era. We have already discovered the beginnings of such a literature among our Aryan ancestors, in the valley of the Indus, as far back as about two thousand years B. C. The historical remains of the valley of the Euphrates and the Tigris reach back perhaps to the twenty-first century. The monuments of Egypt bear unquestionable evidence of the existence of historical thought and expression in that country about twenty-four centuries before the current era. As early as the eighth century the bards and prophets of Israel were wont to reduce their utterances to poetical and semihistorical forms. We find the Greeks, in the person of Herodotus, inventing historical narrative proper at the beginning of the sixth century B. C., and afterwards, by the art of Thucydides, bringing that species of composition to a perfection which, so far as structure is concerned, has never been surpassed.



EGYPTIAN PRIEST TEACHING A NEOPHYTE IN THE TEMPLE.—Drawn by Weidenbach.

We thus see that in regions far remote from each other, among peoples as diverse in ethnic life as any that are found on the earth at the present time, in forms of speech as widely differentiated as any dialects known to philology, there

were at least the rudiments of historical lore at a date ranging from six to twenty-four centuries before the Christian era. This fact of itself constitutes a powerful argument for the antiquity of the human race. Letters and the art of writing are among the later products of primeval man. Even when these have been invented, it requires another long period of development to bring the reflective powers and the art of composition to the level of historical narrative. We speak here not of philosophical history, but of the first rude attempts of the human mind to make record of the events of the past. To these considerations we must in the next place add a third period of great duration to cover the time required in the development of the mind to this grade of activity in wide-apart localities. If it be true that there were men of letters engaged in the historical art in China at an epoch beyond the age of Homer and David; if it be true that at a still earlier period the sages of the Indus valley had begun to produce narrative, as well as song; if it be true, as it certainly is, that the Greeks as a nation had, at the beginning of the sixth century B. C., reached a stage of intellectual progress at which the story of Herodotus might be received with national applause; if, more than all this, in the valley of the Nile the priests and seers of the age of the pyramids devoted themselves in large measure to the composition of sacred history and philosophy, then, indeed, how great must have been the *antecedent* lapse of time requisite for the evolution of these various forms of ethnic life and achievement!

What the wide-apart writings of many races signify.

We thus reach the subject of Tradition proper. While history in the true intent does not presume to fix the time and place of the beginning, tradition has ever been busy with these themes. In almost every nation, among almost every people, a body of traditional lore has been produced in the earlier and half-conscious epoch, and handed down to subsequent times, including the belief of that particular branch of mankind with respect to its own origin. Such traditions in the prehistoric ages became a part of the national faith, was interwoven with the folklore of the people, and afterwards with the whole system of philosophical belief. The myth reached forward out of the past and grasped the present. The poetical fiction mingled with the rudimentary forms of history, and became a wellnigh inseparable part thereof. The dream of the primitive man became a penumbra around the life of the conscious man, and thus the earlier ages of reflection and truth were shadowed and haunted with the fancies and fictions which had arisen in the childhood of the race.

Tradition becomes a penumbra around the conscious life.

Many are the forms and applications of tradition. Generally the body of primitive belief contained one or two essential articles. The first of these, as a rule, declared the high antiquity of the given tribe or people. It was a point of honor among the primitive races to assert priority. The Egyptians, for instance, scorning the narrow limits of earth-made calendars, declared that they, as a race, were *Prosclenoi;* that is, Before the Moon! Almost every tribe and incipient people urged some extravagant claim to a prior possession of the country or place which they occupied. There seems to have been in primitive men, even in the remotest ages of violence and barbarism, some notion that priority gave right and advantage to him who

Essential articles in primeval traditions of our race.

could assert it. This principle in human nature acted powerfully against the preservation of a belief in recent migration, and in favor of the assertion of long occupancy. Though we are convinced that the world was peopled by the diffusion of races, nearly all the early peoples disclaimed this method of possession, and asserted immemorial residence in their respective countries.

These conditions may serve to explain the general prevalence of the belief in an autochthonous origin among the primitive peoples of the world. There was scarcely an extant tradition of human genesis which did not associate the beginning of man-life and tribe-life with the earth. It pleased the fancy of the first men to declare that they were earthborn, or at least that the power which called them into existence used the earth as the vehicle and substance of creation. There was thus established, as it would appear, among each people a sort of claim to the earth by the right of an indisputable priority—a claim which the reader may well perceive to be of great use to sedentary tribes in maintaining themselves against the migratory invasions of others more warlike and adventurous.

Universality of belief in an autochthonous origin.

But the belief among the ancient peoples that they were autochthones did not imply simply an origin from the earth. Vegetable life springs from the soil. The growth of plants must have been one of the first and most tangible phenomena recognized by the senses and considered by the reason of primitive men. The idea that they themselves might have originated *in like manner* would have been natural enough to the situa-

Autochthony derived from analogies of vegetable world.

VIEW OF MOUNT OTHRYS FROM TRIKHALI.—Drawn by Dosso, after Stackelberg.

tion; but the myth took always another form.

There was in the thought of antiquity a conception of evolution and a conception of creation. The two were blended. Man was made out of clay; but a supernatural being was the maker. Among the Greeks one myth ran to this effect, that the first men were *plasmata pēlou*, that is, effigies of baked clay from the hand of Prometheus. And for this deed the jealous deities chained him to the rocks of Caucasus. The more famous belief was that which assigned the origin of mankind to the act of Deucalion

The ancient myths mingled evolution and creation.

and his wife Pyrrha. These twain, saved from a deluge of waters, reached Mount Othrys, where, upon landing, they were commanded by Zeus to cast behind them the bones of their mother. Albeit the bones of the mother meant the stones of the earth. These Deucalion and his wife threw down the hillside, and forthwith sprang up both men and women, who were the Stone race, the *Laoi* of Greek mythology. The Indian myth runs to the effect that Prajapati, the creator, after many tentative experiments, succeeded in producing from the earth a race of beings in harmony with their environment, and therefore capable of surviving. In India, however, the fundamental concept of the genesis of man was inflected into many forms, including beliefs in his origin from the lower animals, rather than immediately from the earth. The legends of Greece, and more anciently those of Egypt and Libya, generally assigned the Cephissian marsh as the scene of man's creation—this if we may accept a fragment of Pindar as authority.

It is not our purpose, however, to pursue the forms of ancient myths, but only to sketch their general character and to deduce therefrom such value as they may hold respecting the antiquity of man. It is clear, in the first place, that the above views relative to the beginning of human life belong to the adolescent period of the mind. A little reflection will show us the stage in the life and development of the individual to which the legendary period in the history of the race corresponds. That stage is childhood; in the one case the childhood of the individual, and in the other the childhood of the race. The period in either instance is that in which the fancy and the senses are wholly predominant over reason and the reflective powers of the mind.

Myths of the origin of man belong to race childhood.

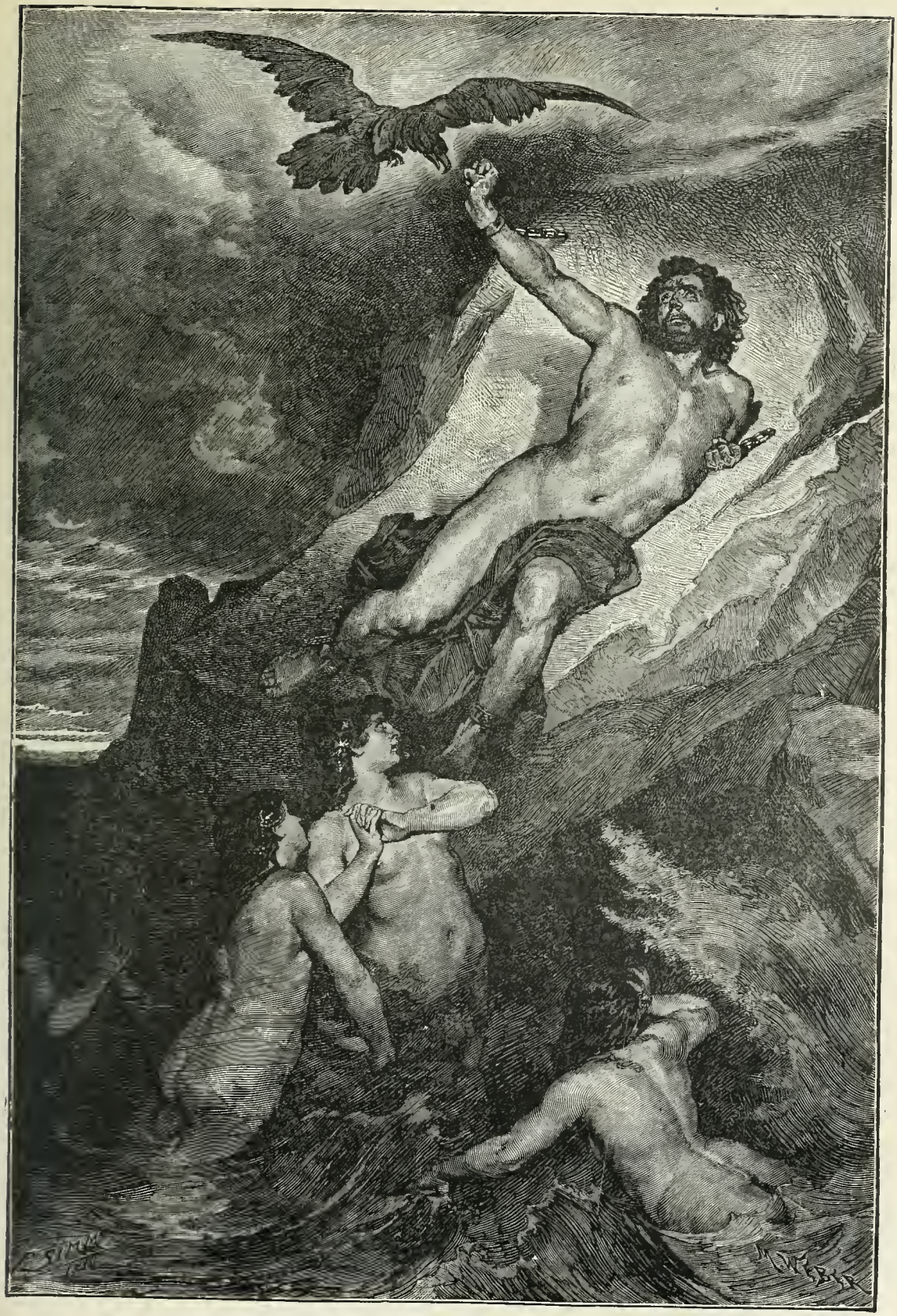
At the time when the tradition of the kind above described was produced, the mind of the race was not as yet haunted with the question, *Why?* nor were the insuperable difficulties which rose in the way of such myths regarded as of the slightest value. For instance, the question might well have arisen among the Greeks how it was that the clay-baked beginnings who arose into consciousness under the touch of Prometheus could have known ought of their origin. How could an autochthonous people have had the slightest memory of the process by which they came into being? How did the *Laoi* of Deucalion understand that they had been produced by the flinging behind of stones? Yet these very obvious forms of rationalism seem never to have occurred to the wise Greeks, even of the classical ages.

The question Why? belongs not to adolescence.

All this is in exact analogy with the life of the individual. The child-mind is not at all concerned about the inconsistencies of a story. To that grade of intelligence the more marvelous the story the more acceptable it is. The legend of childhood impresses itself indelibly upon the memory, and passes down with the current of understanding, mingling therewith and combining with the beliefs and concepts of a later period of development. So with the oral traditions of the primitive world. They were manifestly produced in what may be called the childhood of the race, and were delivered by oral transmission to the conscious race which came afterwards.

Child-mind of individual and of race alike.

The present significance of these facts is that they tend to confirm the belief in the remote origin of the human race, and



PROMETHEUS VINCTUS.—After the painting by F. Simm.

to familiarize our thought with the concept of a long period for the adolescence of mankind. Beyond this it were hard to say that the traditions with which the early life of every people abounds have any value relative to the date of the beginning. It must be constantly borne in mind that chronology and geography are precisely the circumstances which tradition and the traditional age of human history are most likely to neglect. Very little are the primitive races concerned about accuracy as to time and place. Such facts as time and place require investigation, laborious study, travel, mathematical knowledge, and many other conditions which the adolescence of mankind could in no wise supply. Whatever the mind could invent for itself by dream and reverie and fanciful excursion, that was abundantly produced; but the sober and solid materials and structure of real history were too heavy and exact and burdensome to be supplied or borne by the early races of men.

Traditions of man-birth confirm belief in remote race origin.

The great deduction, therefore, from the traditional lore of mankind with respect to the time of the beginning of man-life on the earth must be drawn from the subject-matter of the traditions themselves and from the unmistakable evidence which they present that they were the products of the child-mind of the world. History, on the contrary, is the product of the man-mind. It comes only with the adult age of reason and reflection. We have seen how far back in the past, however, lie the rudiments of historical composition. The argument is that *greatly beyond* this date of the earliest formal efforts of mankind to express its knowledge of itself lay the misty and inchoate realm of tradition and fable. The time relation of such an age is deduced from the character of its products. If the beginnings of history are to be found in wide-apart regions of the earth at a date as remote as twenty centuries before the common era, how great must be the distance of that childhood of the race and that early youth when the mind, still surrounded with all visions and dreams, looked forth into a landscape and beheld on every side men as trees walking!

Child-mind evolves tradition, the man-mind history.

CHAPTER VII.—CHRONOLOGICAL INQUIRY.

WE may next note with interest the results which have been reached in chronology proper. This science is, as we have said, a part of history. Every historic event must, in the nature of the case, have a time locus, and its significance will depend upon its temporal relations. No satisfactory interpretation can be made of the affairs of men without considering them in their relations and dependencies of time. So important has been this element in the annals of mankind that a distinct Science of Time has been developed, and to this is given the name of chronology.

Many ages ago the thinkers of the world began to see the importance of an accurate system of time measurement applied to the affairs of peoples and nations. It is not known, indeed, at how early a date attempts were made to in-

vent from astronomical data a system of years and eras. Perhaps every people in the world on arriving at the conscious and rational stage of development busied itself with the problems of a calendar. The rotation of the earth and the position and aspect of the spheres furnished the data of the first rude calculations, as they have continued to furnish the foundation of the highly refined system of to-day.

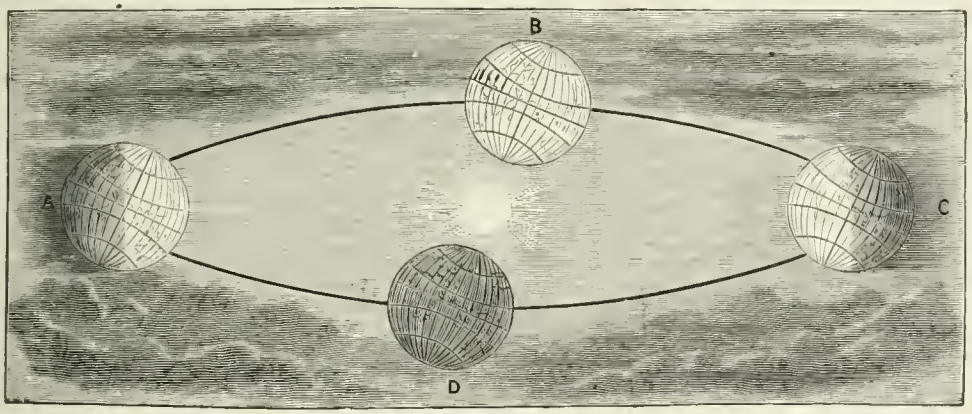
All races seek to invent a system of time measurement.

As a rule, in these tentative efforts at time computation, some prominent event in the tribal or national life was taken as the starting point for all dates. The primitive organization of the state, the founding of the city, the accession of some heroic king, deliverance from some impending disaster, or triumph in some civic or warlike contest, would furnish, each in its kind, a crisis from which all other events would be reckoned. There is an instinctive disposition among peoples to refer all common affairs to the great event gone by, and to measure its distance therefrom, as if a proper estimate of the current fact might best be made by holding it in contrast with an established standard set up at a distance.

In what manner the so-called eras in chronology arose.

It is thus that the so-called eras of chronology have been produced. Almost every nation of ancient times had its own date from which all others were measured by years or cycles. There appears to have been a special activity among the great peoples who flourished in the eighth century B. C. in the work of establishing eras as starting points for chronological measurement. The ancient Hebrews seem to have had in their earlier history no era from which they reckoned the dates of their national life. Such facts in their tradition and annals as the call of Abraham out of Ur, or the exodus of Israel from Egypt, might well have furnished a historical era for the Jewish race. But that people seems never to have adopted any such crisis, but rather to have used the reckonings of other nations.

Great eras established; Hebrews had no date.



PHENOMENA OF DAY AND NIGHT AND SEASON (FOUNDATION OF ALL CALENDARS).

Not so, however, the Babylonians. By them the accession to the throne of the great king Nabonassar, in the year 747 B. C., was taken as the national era, and was long used by the people of the Lower Empire. A short time before this, namely, in the year 776 B. C., the Greeks had established the Olympiad, dating from the victorious contest of Corœbus, in the Olympic games, in the

Fixing of Babylonian, Greek, and Roman eras.

year referred to. Each Olympiad included four calendar years. According to Varro, the city of Rome was founded in the year 753 B. C., and this era was chosen by the Roman race as the origin of dates. It thus happened that the three great eras of antiquity—Babylonian, Grecian, Roman—were established so near to the middle of the eighth century B. C. that a period of twenty-nine years covered them all! It is true, however, that though the events constituting the starting points of the three eras thus lay so near together, the eras themselves were established by the respective nations at subsequent dates much further apart.

Era of the Christ prevails in the West; the Julian period.

The three eras referred to continued to be used until the Christian religion had risen to such importance in the Roman empire as to be able at length to substitute the birth of the Christ for the founding of the city. The new era gained the day among the Western nations, and is at the present time more extensively used than any other epoch of computation. The substitution of the new for the old led to much confusion in fixing the dates of historical events, and it was to remedy this difficulty that Joseph Scaliger, in 1582, invented what is called the Julian period. This, indeed, is not an era, since it does not begin with any particular date in the past. It uses as its units the years as they were fixed by the calendar of Julius Cæsar, and the Christian era is made to correspond with the year 4714 from the beginning of the period. A scale is thus furnished by which any year of the era of Nabonassar, of a given Olympiad, or from the founding of Rome, may easily be reduced to terms of the Christian calendar; that is, to the corresponding year B. C.

Hebrews choose and Christians accept the era of the world.

In the early centuries of our era the Christians in many parts were scandalized with the observance of pagan festivals according to dates and anniversaries which had been perpetuated from the classical ages. In order to free themselves from these heathen rites the adherents of the new faith began to imitate a usage which had now grown up among the Jews of reckoning from the creation of the world. Israel had by this time become sufficiently scholastic to produce a calendar which in its terms reached back to the beginning of things. The Christians deemed it wise to imitate the Hebrew method, and to employ the supposed date of the creation as an era from which to reckon all subsequent events. In doing so, however, there was much confusion. It was found that the Old Testament narratives presented the elements of at least three distinct computations. There were three texts of equal authority, and neither agreed with the others in the matter of dates. There was a Samaritan, a Hebrew, and a Greek text of the Scriptures, containing irreconcilable accounts so far as time was concerned. Nor was there any other calendar with which the three might be compared and thereby corrected.

Attempts to fix date of creation out of Hebrew Scriptures.

It thus happened that among the Christian nations of the West the era of the creation came to be referred to as the primary epoch to which all other events must be referred. In the later Middle Ages, and down to the beginning of critical scholarship in our own century, the effort was many times renewed by the unlearned dogmatists of the time to fix the date for the creation of the world and whatever therein is. For it must be understood once for all that

the era of creation which credulous scholastics have so much busied themselves to find was always, in the estimation of those who sought it, the era not only of the physical world, but also of the human race. The theory of coïncident origin for the world and its inhabitants was held implicitly by the early chronologists, and was incorporated by them in their systems of reckoning. In the absence of facts, hypotheses, unwarranted assumptions, and vague applications of the three different texts of the sacred writings of the Hebrews led to an endless variety of results. Desvignoles has collected more than two hundred sets of calculations, the authors of which have attempted to determine the era of creation from the Scriptures. Nor is it possible for the modern inquirer, with these computations before him, to extract therefrom any one system, or to form a new one out of the given materials more satisfactory than the rest.[1]

Among the calculations to which reference has just been made, the briefest of all is that by the Rabbi Lipmann, which assigns the year 3483 B. C. as the era of the creation. The longest of all is that by Regiomontanus, which sets the date of 6984 B. C. as the beginning of the world. Contradictory results; rise of the Usherian system. We have thus the scholars and chronologists of the fifteenth, sixteenth, and seventeenth centuries—though they employed the same data, namely, the three texts of the Scriptures—differing among themselves by as much as thirty-five centuries! It could hardly be supposed that out of such diverse materials and such contradictory results any conclusion of importance could be deduced by modern scholarship as to the era of the world.

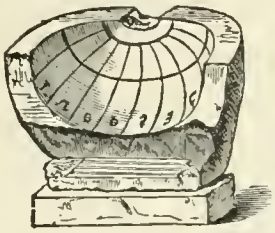
It was, however, from these data that Archbishop James Usher undertook, at the middle of the seventeenth century, to prepare a system of sacred chronology. The result, strangely enough, was the production of a work which gained and held an ascendency among the writers of the Western nations for more than a century. It is only in recent times that scholarship has succeeded in unseating the Usherian system from the places of learning, and even to the present day it continues to exercise a remarkable influence over the common mind, especially among the English-speaking peoples.

The reason of the ascendency of this system of dates in the literature of Europe and America is to be found in the fact that the Usherian scheme secured for itself, without warrant of fact, the claim of being a biblical chronology. Literature and philosophy of Europe infected thereby. By some unknown authority the dates prepared by Usher were inserted in the margin of authorized editions of the Scriptures of the Old Testament, and having once gained a place therein, the uncritical and unscholarly opinion of the

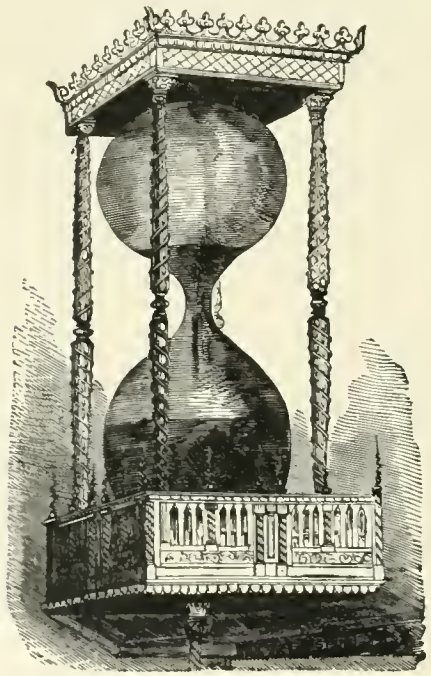
[1] The fundamental difficulty in making out a biblical chronology for antiquity lies in the irreconcilable differences of statement as to the ages of the first ten patriarchs as given in the Hebrew and Septuagint texts. The following table may interest the reader as illustrative of the many disagreements between the two principal texts of the Scriptures upon which modern times have placed reliance as authentic records:

Patriarchs.	Age at Birth of Heir.	
	Hebrew Text.	Septuagint.
Adam	130	230
Seth	105	205
Enos	90	190
Cainan	70	170
Mahalaleel	65	165
Jared	162	162
Enoch	65	165
Methuselah	187	187
Lamech	182	188
Noah (at flood)	600	600
Time of the flood	1,656	2,262

age permitted their retention. From this source the system diffused itself into general literature. The historical writers of the last century and of the first half of the present century, for the most part, continued to accept and to employ the Usherian dates for all the events in the ancient history of mankind. To the present day the authorized editions of the Bible are sent forth with the Usherian chronology in the margin, and in the popular belief that system is referred to the same source and authority as that by which the sacred canon was produced!



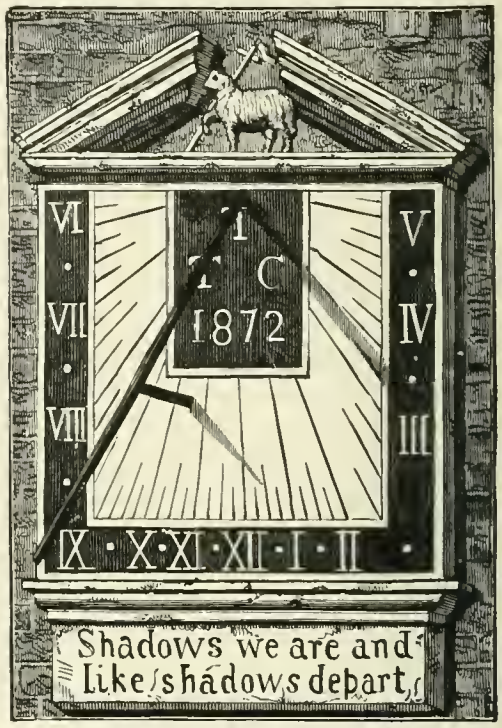
TIME INSTRUMENT—ANCIENT SUNDIAL.



TIME INSTRUMENT—HOURGLASS.

It was thus that in modern times a supposed date has been established for the era of the creation of the earth and man. Usher fixed upon the year 4004 B. C. and the autumnal equinox of that year, namely October 23, as the precise date of the apparition of the world! The creation of man he placed with equal exactitude five days later, that is, on October 28th![1] The remainder of

Astonishing details of the Usherian scheme.



MODERN TIME INSTRUMENT—SUNDIAL.

[1] It is matter of profound astonishment that such a system of chronology as that devised—utterly without warrant of fact—by Archbishop Usher, should have been received and adopted by the best scholarship of England as late as 1825: this, too, without the slightest apparent distrust! The new *Edinburgh Encyclopædia* of the date just named, conducted by Sir David Brewster, with the assistance of more than a hundred European scholars most eminent in science and literature, incorporates without the slightest note of dissent the Usherian system. The reader of the present day, and still more the reader of the future, will almost doubt his senses when he finds the chronological table in the great encyclopædia just referred to beginning as follows:

"4004 B. C. The world created at the autumnal equinox, on Sunday, October 23.

* * * * *

"Adam and Eve created on Friday, October 28."

History is not the place for satire or humor; but the comment is pardonable, and the inference might well be drawn from these astounding particulars of the creation that Archbishop Usher had been a schoolmate and playfellow of the progenitor of the human race!

the primitive scheme was arranged with like precision and confidence; nor may we well be offended at so monstrous a chronological system when we remember that its author was born only thirty-four years after the death of Luther. Our astonishment must be abated when we remember that the Usherian chronological tables were prepared before Louis XIV was twenty years of age and within less than a half century of the planting of the first English colonies in the New World. That a trustworthy system of chronology could be produced in such an age and from such materials as were then extant, under the scholastic methods which then prevailed in the English and Irish universities, is a supposition beyond the limits not only of reason, but of possibility.

Large place of Usherian system in modern writings.

The Usherian system of dates, however, though originated in absurd assumptions and pressed into form by the hand of dogmatism, has played a large part in the historical writings of Europe and America. Beyond these and through them it has reached the popular belief, becoming as it were an article of faith, and intimately associated with orthodoxy in religious belief. The system has thus performed a most deleterious office, particularly since the beginnings of scientific scholarship within the current century. Almost every branch of historical inquiry has been checked and impeded by the preconceived opinion that there exists a system of biblical chronology for antiquity to which all events, since the appearance of man, must be conformed.

As a matter of fact, the so-called biblical chronology, with its supposititious era of creation, was invented by an Irish prelate born in the sixteenth century; was imposed on the sacred books in some unknown manner and without the sanction of any ecclesiastical authority; was foisted, as it were, upon the books of the Old Testament, and forced into union with them; and was henceforth made to supply the place of investigation and forestall the advance of knowledge. It is only within the last half of the present century that the system of dates invented by Usher as a sort of compromise and average among others that were irreconcilable has been challenged, dethroned, and put aside from all the high places of scholarship, holding its place only by usurpation and folly in the authorized editions of the Bible.

The system an impediment to inquiry and knowledge.

It may suffice to refer briefly to some of the other eras which have been employed in the attempted measurement of time and the emplacement of the dates of antiquity. After the dispersion of the Jews, and up to the fifteenth century, that people employed in their business affairs and secular records what is called the era of the Seleucidæ, that is, the year B. C. 311; but since the fifteenth century the Israelites have fallen back upon their interpretation of the Hebrew text for the era of the world, fixing that event at the year 3760 B. C. Meanwhile, the Greek Christians of Russia and the East adopted for themselves what is known as the era of Constantinople, which places the creation of the world in the year 5509 B. C., and makes the Christian era coïncident with the fourth of the one hundred and ninety-fourth Olympiad. There is also what is known as the era of Alexandria, which placed the creation in the year 5500 B. C.

The other principal eras of time reckoning.

It were better, however, to satisfy the reader's curiosity in these particulars by a tabulated statement showing the rela-

tions of the principal eras which, until a comparatively recent date, have been employed in fixing the time relations of events in the ancient history of the world. The table is inserted, not because of any value in its fundamental assumption of the era of creation, but only as a convenient reference to exhibit the relations of the more important eras:

Synoptical view and comparison of the leading eras.

geological and archæological research the discrepancy between the facts of the prehistoric world and the current system of dates became apparent. One or the other had to yield. Either scholars and travelers must disbelieve the testimony of their senses or reject the narrow and dogmatic system which the old chronologists had fixed up as the framework of ancient history.

Scientific spirit works havoc with old dates.

The era of creation corresponds to.....	The year 4004 B. C. The year 710 of the Julian period. The year 3251 before the founding of Rome. The year 5996 of the French era.
The first Olympiad corresponds to.....	The year 776 B. C. The year 3228 of the era of creation. The year 23 before the founding of Rome. The year 3938 of the Julian period. The year 2568 before the French era.
The founding of Rome corresponds to.....	The year 753 B. C. The year 3251 of the era of creation. The year 4 of the sixth Olympiad. The year 3961 of the Julian period. The year 2543 before the French era.
The common, or Christian, era corresponds to	The year 4004 of the era of creation. The year 1 of the 195th Olympiad. The year 753 of the founding of Rome. The year 4714 of the Julian period. The year 1792 of the French era.
The Hegira corresponds to.....	The year 622 of the Christian era. The year 4626 of the era of creation. The year 3 of the 348th Olympiad. The year 1375 of the founding of Rome. The year 5336 of the Julian period. The year 1206 before the French era.
The era of the French republic corresponds to	The year 1792 of the Christian era. The year 5796 of the era of creation. The year 1 of the 643d Olympiad. The year 2543 of the founding of Rome. The year 1206 of the Hegira. The year 6506 of the Julian period.

In no department of human knowledge has the scientific spirit wrought greater changes during the last half century than in the previously accepted chronology. With the beginning of

Philology, the science of human language, added its testimony. The ruins of Nineveh and Babylon were exhumed from the oblivion of centuries, and the cylinder-tablets of the library of

Asshur-Bani-Pal were recovered for the instruction of mankind. The cuneiform inscriptions were translated. The hieroglyphics of Egypt opened their long-sealed treasures. The vision of men began to clear, and the narrowness and incapacity of the old system of chronology were seen in ridiculous outline against the almost limitless background of the past.

Results of historical research among several races.

The chronological researches of scholars in recent times have been directed to special fields of inquiry rather than to the establishment of a general system for the whole ancient history of mankind. The result has been that the annals of China and India have been traced back by means of native records and monuments of a fairly creditable character to about 2200 B. C. Sir John Gardner Wilkinson has fixed with approximate certainty the beginning of the fourth dynasty of Egypt at the year 2450 B. C. — to which must be added at least the uncertain period covered by the preceding dynasties. Karl Richard Lepsius, laboring in the same field of inquiry, has extended the period of Egyptian history back to the beginning of the first dynasty, to which he assigns the date of 3892 B. C. The French Egyptologist, Mariette, one of the most expert and skillful scholars of the century, by a cross-examination of the history of Menetho and the Egyptian sculptures has shown many reasons for fixing the date of Menes as far back as 5004 B. C. The Chaldæan records, according to Berosus, extend to a much higher antiquity than that assigned for the beginning of Egyptian history, and the careful Rawlinson fixes upon the year 2286 B. C. as the approximate date for the accession of the first dynasty of Old Babylonian kings. On every hand the scheme of dates has been widened out by the most competent scholars of the age, in so much that all rational belief in the chronological tables which were accepted at the beginning of the century has passed away.

General deduction respecting the antiquity of man.

What then does chronology as a department of historical investigation prove or tend to prove with respect to the antiquity of man? It shows that many great nations of the ancient world, widely separated, in some instances by high mountains and almost impassable seas, were already developed into fixed forms of society and government, already in possession of institutions and laws and literary forms of record, at dates ranging from twenty to fifty centuries before the common era. To this we must add the monumental evidence already obtained relative to the ancient peoples of the

STONE MASONRY ON THE SUMMITS OF THE ANDES.

American continent. Such facts as the ruins which have been discovered in Central America and the stone-hewn foundations of temples and palaces in the tops of the Andes must tend strongly in every thoughtful mind to increase rather than diminish the chronological estimates of the antiquity of the ancient European, African, and Asiatic nations.

We may now proceed to *summarize* in a few paragraphs the various evidences which may be gathered from scientific and other sources of inquiry respecting the age of man on the earth. In the first place, the astronomical conditions and laws under which our planet came into the habitable state furnish us with a tolerably accurate estimate of the time when with the subsidence of our last planetary winter the earth, by the favoring conditions which were then introduced, presented itself as a fit abode for the human race. With due allowance for the prolongation of the epoch of rigor and for the melting away of the ice cap in the northern hemisphere, and with certain other allowances which are suggested by science and right reason, and with the application of the law of averages between the maximum and minimum dates which may reasonably be assigned for the appearance of man, we may fix the time of his coming approximately at *thirty thousand* or *thirty-five thousand years* before the Christian era.

Summary of the arguments: astronomical indication.

With this conclusion the important, almost irrefragable, evidence of geology fully corresponds. The investigation of the earth's crust has not yet positively demonstrated the remains of man and of his works belonging to a period quite as remote as that indicated by the astronomical antecedents as the approximate time of the habitability of the globe. But the geological evidence has stretched out far toward the same remote date for the origin of our species. If we trust to geological evidence and indications *only*, we shall have to reduce the astronomical indications respecting the date of the appearance of man by perhaps a hundred centuries. It is clear, however, that after making all proper allowances for error of computation, mistakes of judgment, and partiality of the inquirer for one form and result of conclusion instead of another, and after estimating as well as may be done the irregularities in the rate of change in the formation of the earth's crust at different geological periods, we must still assign a date of not less than from *twenty thousand* to *twenty-five thousand years* B. C. as the time of those geological formations with which the remains of man and the traces of his activity are indubitably associated. To this conclusion should be added the consideration that the lesser estimate for the antiquity of man, gathered from geological evidences as compared with the estimate from astronomical conditions, furnishes against the latter only a negative form of proof. All that may be said is that geology *has not furnished* as high an estimate for the date of the appearance of man as is indicated by the astronomical conditions which perfected the habitability of the planet at a period somewhat more remote.

Geology corroborates the results arrived at from astronomy.

The great foundations of the inquiry lie in the solid structure of geology, including the astronomical antecedents by which the globe was prepared for the maintenance of man-life upon it. About these conditions all other forms of proof are related and made thereto dependent. The archæological evidence respecting the antiquity of man has its principal sig-

Geological research lies at the foundation of the inquiry.

nificance from the geological basis on which the whole science reposes. The evidence afforded by the remains of man and the fragments of his industrial arts transmitted from the prehistoric ages depends constantly for its value upon the geological correlation and dependency. From this origin of calculation and estimate the archæologist proceeds with much the larger part of his investigations. But while it is true that the significance of his results depends upon those already reached in geological science, it is also true that those results *fully harmonize* with the deductions of geology, and corroborate and sustain them without break or discrepancy, in so much that the evidences afforded by the two branches of inquiry become common and consistent as a whole. We may therefore repeat as a conclusion drawn from archæological research the same approximate date deduced from the records and inferences of geology, namely, a period of *twenty thousand years or more* before the common era as the epoch of man.

Deduction from palæontology harmonizes with other results.

With this latter estimate coïncides also the deduction from palæontological inquiry. Here again we fall back upon geology, not indeed for the *order* of the facts considered, but for the approximate *dates* to which the facts must be assigned. Those forms of animal and vegetable life with which the remains of man are associated in the geological matrix of the earth are referable to the same kinds of proof as to their antiquity as are the other materials of archæology. To a certain extent the antiquity of the prehistoric flora and fauna may be determined independently of the age of the geological epochs to which the same belonged. But, on the whole, the argument from palæontology has the very same basis, so far as the antiquity of man is concerned, as that from archæology; and each alike corroborates the geological record with respect to the age of man. Negatively it may be said that palæontological research has in no case tended to *reduce* the high estimate for the antiquity of man which has been made from the basis of geology.

Anthropological deductions are essentially the same.

The same results are reached from the anthropological point of view. Every branch of man-study points unmistakably to an origin for the human race remote from the present by not *less* than *a hundred centuries*. The evidences found in the human body of organs and offices which had already become rudimentary before the beginning of historical records; the like indications of the prehistoric differentiation of the sexes, by which the traces of a common physical life were left in each; the established slowness of the intellectual evolution of the race, whereby the increment of mental power and the average capacity of the faculties of the mind have hardly been perceptibly augmented in the space of three thousand years, and many other facts and laws of human development which have been scientifically determined, all tend to establish beyond doubt an antiquity for the race approximately as high as that indicated in the deductions of geology.

Ethnology and ethnography point to identical conclusions.

So also of ethnological and ethnographical inquiry. The period requisite for the ethnical dispersion of the race must have been as great as that furnished by the indications of geology, archæology, and anthropology. We may mark with certainty not only the presence but the historical development of the different races of Asia, Africa, and Europe at a time so far remote from

the present as to warrant, and, indeed, compel, the conclusion that the length of time required for the differentiation of the various peoples from some common stock was fully as great as that indicated by the rude implements and other remains of primitive mankind and the emplacement of the same with the later, if not the middle, deposits of the Drift. No scholar can reflect with earnestness and dispassion upon the phenomena of tribal and race development among the Aryan families of men only without perceiving the stretch of immeasurable time requisite for the whole distribution — for the departure, migrations, settlement, and evolution of the Indic peoples, for the like divergence, organization, and development of the Iranic nations, for the far-off and vine-like progress of the fathers of the Græco-Italic tribes, and older than they the Celts, and perhaps the Teutonic barbarians of the northern forests, all gradually rising through slow and painful processes to the plane of permanency and conscious life—without perceiving the necessity for a span of at least *a hundred centuries* to accomplish the given results apparent at the beginnings of recorded annals.

EXTREME OF ETHNIC DIVERGENCE—HIGHEST TYPE.—(1) EROS OF PRAXITELES.
Drawn by C. Colb.

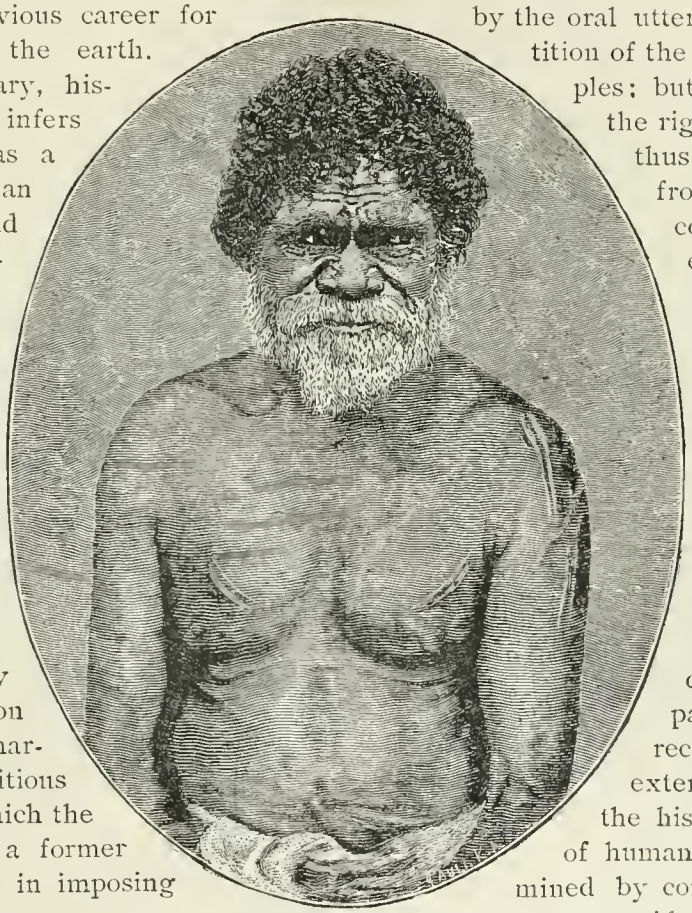
Back of all this a still profounder vista must be opened of at least equal extent, in order to provide the time and conditions of ethnic change, such as were necessary for the division of the Aryan races from the Semitic and Hamitic families, from that ancient Cushite stock seen with difficulty on the horizon of Egypt and Arabia and the Lower Euphrates, from the original Black races of Africa and Australia, and finally from the ancestors of those Asiatic and Polynesian Mongoloid varieties of mankind which to-day are represented by at least one half of the inhabitants of the earth. The demands of ethnology can hardly be satisfied with a period for the whole distribution of mankind, and for the development of the ethnic varieties already present in the dawn of history and tradition, of less than a *hundred and fifty centuries*. An ample estimate for the required time, not unreasonable in view of the demonstrable conditions that have surrounded the progress and differentiation of the race, may be set at *twenty thousand years*.

Large allowance must be made for the period of race dispersion.

With such conclusions history and tradition—including the special department of chronology—are in full and harmonious accord. History does not say or intimate that the world of man-life extends only six thousand years into the past. As we have shown in the foregoing pages, the testimony of history is negative rather than positive with respect to the date of

History substantially accordant with the other sciences.

the beginning. Nothing more can be expected of historical research proper than to record such dates and epochs of the past as are deducible from contemporaneous documents, industrial remains, and monumental inscriptions. But it does not follow that because she can go no further than this there was, therefore, no previous career for mankind on the earth. On the contrary, history clearly infers that there was a childhood, an adolescence, and at last a maturity into consciousness of the primitive races. With this view the historical record, as far as it extends, is in entire accord. Historical inquiry looks already with clear vision across those narrow and factitious eras of time which the ignorance of a former age succeeded in imposing upon mankind as a dead wall and boundary to the ancient world. History sees beyond these limitations the shadows and outlines of the real facts of the early morning of the race; but she does not presume to say *thus-and-so* of events and movements concerning which she has not, and in all probability can never have, the testimony of contemporary records.



EXTREME OF ETHNIC DIVERGENCE—LOWEST TYPE.—(2) AUSTRALIAN OF THE TOWNSVILLE COAST. After a Danish drawing.

History accepts at their proper valuation the traditions and legends of antiquity. She gives to them such credence as the master gives to the stories of the nursery and the playground. She gladly admits what truth soever may have been transmitted from the most ancient times to the epoch of records and monuments by the oral utterance and repetition of the primitive peoples; but she disallows the right of oral story thus handed down from age to age to contradict the exact and indisputable evidence of science and to set tradition on the throne in the place of truth.

Oral story may not contradict science and right reason.

We have seen in the foregoing pages to what depth into the past the actual records of our race extend. Perhaps the historical horizon of human life, as determined by contemporaneous evidence, lies not far from the line of forty centuries before the Christian era. But this signifies no more than that the record is there broken by the limitations of human knowledge. Beyond that border line, which for the present divides the historic from the prehistoric life of man, extend those vast unrecorded epochs of human existence concerning which our informa-

Historical horizon about the line of the fortieth century B. C.

tion must be derived from those branches of science which have extended their investigations beyond the historical horizon.

We have endeavored in the preceding pages to gather and summarize the evidences which the present state of knowledge has furnished with respect to the extent of man-life backwards through the prehistoric shadows. While much remains as yet indeterminate, while the evidence in many parts is indecisive, while the application of the law of averages and probabilities may mislead somewhat the most skillful research respecting the vestigia of human life in the prehistoric ages, we are nevertheless fully warranted, by the juxtaposition of all the proofs, in accepting it as an established fact that the appearance of the human race belongs to a date not less than *two hundred centuries* from the present time. It only remains to remind the reader that "human race" in this assignment of an approximate date for its apparition signifies that species of beings the traces of whose primitive life are found close down to the miocene era in geology, a species having the rudiments of reason, the upright form, and the potency of the civilized life, but otherwise not strongly discriminated from the higher primates except in the ability to fashion an implement and to kindle a fire.

Final estimate of the date of the beginning.

CHAPTER VIII.—THE QUEST OF EDEN.

HAVING traversed the field of inquiry respecting the probable date of man's appearance on the earth, we come, in the next place, to consider the *place of his origin*. Since there was a time in the history of our globe when men did not exist upon its surface, and since there was a date at which human beings in some manner made their appearance and became the progenitors of the race, there must have been a place of apparition, a point or points from which the first men and their descendants took their departure to people the earth. Science, conjecture, and blank dogmatism have all in turn sought to solve this problem. Nor can it well be said that even at the present advanced stage of inquiry the question has been satisfactorily settled.

Origin of man-life necessarily in some locality.

It will be seen at a glance that the subject before us, namely, the place of the beginning of man-life on the earth, is involved with another question which we are to consider hereafter. That other question relates to the unity or multiplicity of the origin of mankind. If the monogenetic theory be true, then only *one* place is to be sought as the point of original departure for all the races of men; but if the polygenetic theory should be established, then several, perhaps *many*, points of origin must be ascertained—at least as many as may correspond to the leading ethnic varieties of human kind.

One place or many places a condition of the problem.

There have not been wanting scholars and thinkers of the current century who, after an extensive survey of the field of inquiry, have adopted the theory of polygenesis; that is, the doctrine of the multiple origin of mankind. According

to this belief, the race has sprung from several fountains wide apart in place and time. There has been one fountain for the Black races of Africa and Australia, another for the Asiatic Mongoloids, another for the Polynesians, another for the nomadic races of Northern Asia, another for the Indo-European, or Aryan, family, and still another, or perhaps more than one, for the aborigi-

Theory of the multiple origin of mankind propounded.

TO PEOPLE THE EARTH.—Drawn by Riou.

nal races of the American continents. From these several points of departure the vines of diverse human life have sprung and extended themselves by devious growth over the surface of the earth.

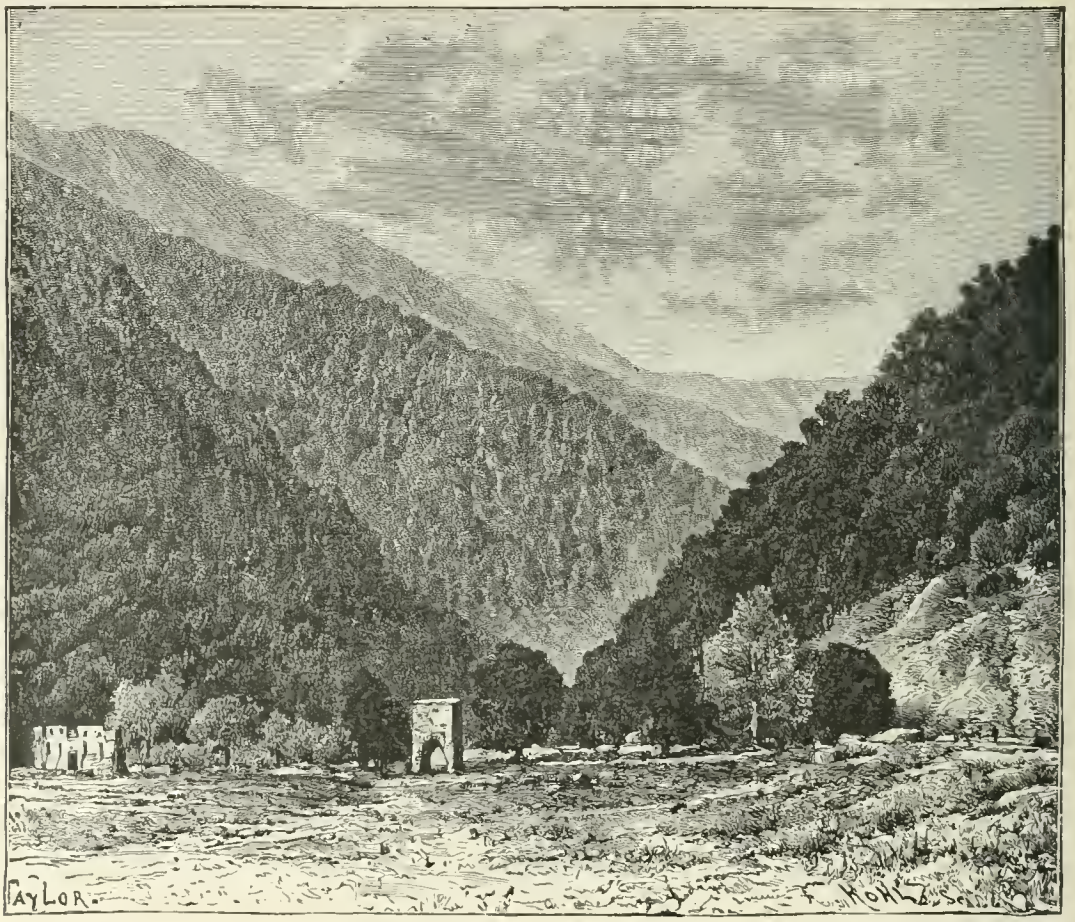
We may not here pause to consider the merits of the two opposing theories of the single and multiple origin of mankind. It is sufficient to note the fact that if the hypothesis of polygenesis be admitted as true, then the interest in the inquiry as to the geographical locus of the first men is in great measure taken away. Should it be shown that the human race has had more than one point of original departure, then it may have had ten places of beginning or a hundred. Indeed, if we adopt the polygenetic theory, we put the inquiry upon another foundation—that of supposing that when the earth was in a certain cosmical stage of development and preparation the conditions antecedent to man-life were present and prevalent over a large part of the globe, from which conditions human existence was as likely to take its origin in this place as in that.

Polygenesis, if admitted, destroys interest in the inquiry.

Hereafter we shall consider the value of such a theory as explanatory of the manner and means by which the appearance of man on the earth is to be accounted for. But for the present we shall take up the opposite view as more

Opposite view more accordant with facts and reason.

nearly in accord with the facts, shall adopt the theory of the unity in *place* as well as in *time* of the origin of all mankind. With the acceptance of this view, our interest in the attempted discovery of the point of departure from which all the kindreds and families of men have derived their ultimate descent is greatly heightened.



HIGHLANDS OF ARMENIA.—Drawn by Taylor, after a photograph by Madame Carla Serena.

The general belief among the nations of the West on this subject has been derived from the Hebrew Scriptures, constituting the basis as they do of the religious faith and practice of the Israelitish race and, in later development, of the faith and practice of all the Christian nations of the earth. The account given in Genesis not only of the manner, but of the place of the origin of mankind, has formed a part of the foundation of those great systems of religious thought and powerful ecclesiastical organizations which have constituted so strong an element in the civilized life of the nations of the West. The account of man need not here be repeated. It is sufficient to say that the scene of this beginning of human life is fixed by the record as in "a garden eastward in Eden." It is said that "a river went out of Eden to water the garden; and from thence it was parted, and became into four heads. The name of the first [that is the first head or river] is Pison:

The "garden eastward in Eden," with its four rivers.

THE BIBLICAL PARADISE.—Drawn by Gustave Doré.

that is it which compasseth the whole land of Havilah, where there is gold; and the gold of that land is good: there is bdellium and onyx stone. And the name of the second river is Gihon: the same is it that compasseth the whole land of Ethiopia. And the name of the third river is Hiddekel: that is it which goeth toward the east of Assyria. And the fourth river is Euphrates." Here we have the geographical definition, so to speak, of that place which is described in Genesis as the scene of the creation of man.

Difficulty of fixing the place of the biblical Eden.

But where was the garden of Eden? Is it possible to lay this ancient sketch of the Scriptures practically on a map or globe and define its position? Many have been the efforts of scholars and visionaries to accomplish this task of identifying the ancient Eden with some place or places now known to men. In the first place, it may be observed that only one of the four rivers which are said to have taken their rise from Eden is known or has been known to the geography of modern times. The others are lost, either in mythology or in changes which have supervened in the character and distribution of ancient rivers. As to the Euphrates, the stream has been explored through its whole course. Its head-waters lie in the highlands of Armenia. But from that situation there is no Pison to compass the land of Havilah, nor is there any Havilah which may be discovered, except by the fancy of him who searches for it. Neither is there any second river called Gihon, rising from Armenia to encircle Ethiopia. And if the name Ethiopia have been used in the ancient record as equivalent for the countries possessed by the primitive Cushites, then no river proceeding from Armenia other than the Euphrates itself could be said to approach, much less to encompass, Ethiopia. As to the third river, Hiddekel, that likewise is impossible of identification, unless indeed we suppose the Tigris to be meant; and certainly that stream does not flow toward the east of Assyria. In other words, if we accept the identity of the Euphrates mentioned in the second chapter of Genesis with the river of that name which flows from the mountains of Armenia to the Persian gulf, we find it impossible to identify the other three with any existing streams without supposing that the geographical landscape has been transformed by some revolution of nature.

Hebrew narrative consistent with all the Semitic traditions.

We may here pause to note that the narrative of Eden as given in the Book of Genesis is common in its leading features with traditions which still exist, or which have existed, among the collateral branches of the Semitic race. The ancient Aramaïc peoples, the Chaldæans, perhaps the Old Arabians, the Ishmaelites and their descendent nations of the Arabian peninsula, no less than the Hebrews themselves, had the same tradition, though much inflected in its parts and circumstances, as did the family of Abraham. It is evident, therefore, that a belief in an Eden, with its four emergent rivers and for its occupants the ancestors of the human race, was prevalent among the Semites at a date long before the Babylonians were Babylonians, or the Hebrews were Hebrews.

The Euphrates of Genesis not the Euphrates of geography.

Reviewing the subject in the light of actual geography, we may best of all conclude that the river Euphrates referred to in the ancient tradition, of which the account given in Genesis is the most authoritative, if not the oldest,

form, was some other than the stream now known by that name. We should thus be driven to reject altogether the emplacement of Eden in the Armenian highlands, and to seek for it at the source of some other system of streams corresponding with those mentioned in the Book of Genesis. But in so doing we at once enter and are soon lost in the region of conjecture.

THE CEYLONESE EDEN.

It may well surprise the reader who may not have given special attention to the subject, to note the various conflicting and visionary views which have not only been entertained, but have been put by their authors —scholarly men even, according to the standard of their age— into criticism and general literature respecting the place called Eden. Some of the older writers were inclined to lift it from the surface of the earth, and to assign it a position in the third or fourth heaven. Others, less mythological, but hardly less extravagant in their credulity, have assigned to Eden a place within the orbit of the moon, while still others have contended that it lay in the moon itself! Some have tried to locate the terrestrial paradise in the upper air, but beyond the attraction of the earth. From these celestial emplacements the less fanciful searchers for the original seat have given it a place *under* the earth, far within our sphere, or some unknown situation on the surface. Still another

Visionary and absurd views of the place of Eden.

class would have us accept the north pole as the place of Eden, while others go into the equatorial regions in the search. Tartary and China have both been selected as the countries within whose borders Paradise was established. The banks of the Ganges and the island of Ceylon have in turn been chosen as the site of Eden. The more rational have generally attempted to fix the place in Armenia; but others rejecting the suggestion furnished by the mention of the Euphrates, have fixed the situation in Equatorial Africa. Mesopotamia, Syria, Persia, Arabia, Babylonia, Assyria, and Palestine itself have all had their advocates as the honored land in which lay the ancient Eden. More recently the claims of Europe to the distinction have been advanced and strenuously defended; and in this particular the advocates of a European Paradise have had the advantage of some strong scientific indications; for it is now agreed that the most ancient relics of mankind as yet discovered in the crust of the earth are those which the archæologists of recent times have found in Central and Western Europe.

Modern scholarship fails to identify the Paradise.

The modern scholar is obliged to abandon the pursuit. True, he may very properly and anxiously seek to discover the point of origin from which the human race has proceeded; but the location of the particular Eden, or Paradise, described in the second chapter of Genesis may well be given over as a hopeless task. The geographical concomitants do not consist with the present character of any of the countries to which the place has been assigned. In order to identify the spot called Eden, we are obliged to concede to him who is leading the discovery so many things as to make the whole argument incongruous, if not absurd. The identity of Eden, for instance, with the region about the north pole, can be shown, no doubt, to the satisfaction of one who begins with the conclusion which he is trying to establish, and whose credulity has been stimulated with the indulgence of the fallacious hope of demonstrating a preconceived opinion; but to the inquirer who takes up the subject without preconceptions and prejudices no single proof will appear which may properly be regarded as valid.

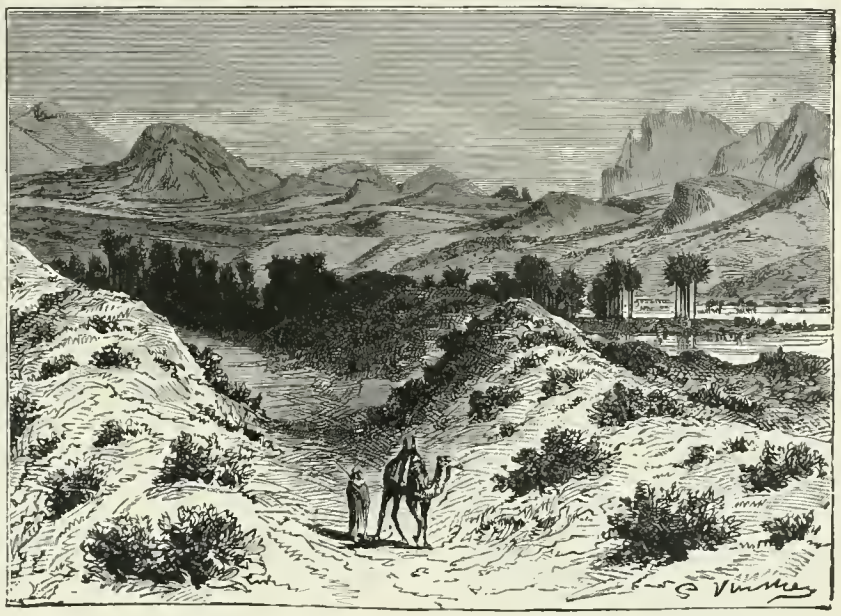
The places suggested may be excluded by negation.

In pursuing the inquiry, it is well to adopt the argument by exclusion. Negatively, the traditional garden of Eden may *not* be found in this place or in that. We may show by almost irrefragable proofs that many of the assumptions which have been made about the location of Eden are untenable. If, for instance, the favored hypothesis of the Armenian highlands can not be entertained without supposing that a river descending from that locality can make its way into Equatorial Africa, we may properly reject the supposition as impossible. Or, if we must suppose a river flowing over the crest of the Caucasus in order to make its way into the Black sea or the Caspian, we may reject that hypothesis also. So in any other case, if insuperable barriers interpose, instead of trying to reason them away with preconceptions and syllogistic leverage, we should at once reject the proposed theory as contradictory of the facts, and therefore impossible. But if, on the other hand, a hypothesis can be formed against which no inexplicable facts may be opposed, and with which all the discoveries made by scientific investigation fairly harmonize, then we may at least tentatively accept such a supposition as the basis of a true theory of the primitive origin of the human species.

Let us therefore look attentively at some of the views which have been entertained about the location of the first seat of the ancestors of mankind. Certainly we need not adopt any of those mythological and transcendental notions which the credulity of even recent centuries adopted and foisted upon posterity as a solution of the question. What shall we say of the idea that mankind originated somewhere in the celestial sphere round about? Shall we indeed be terrified by sheer dogmatism from rejecting such an opinion as belonging to the superstitious era in the evolution of human intelligence? Such a notion fairly becomes the childhood of the race. It is fitting that children should be satisfied with the notion of a Paradise fixed afar somewhere in the orbit of the moon, or on the face of that bright globe, and that the ancient Eden thus hung up in the skyland should dip down into touch with the earth, and at length, after the rebellion and expulsion of its inhabitants, be drawn back from contact with this low and degraded sphere where the great act of life must henceforth be performed. But why should such opinions be obtruded upon the adult age of the world? Why should they be thought to hold some important relation to the happiness and conduct of human beings? Why should they be thrust in and blended with the scientific concept of our earth and its inhabitants? Is it indeed possible that any intelligent human being will accept it as true that the Eden of our origin lay beyond the sphere of earth—was not a part of the plain, substantial, unmetaphorical surface of the ground, such as we see it and know it with our clear senses and perceptions at the present day?

Mythology must yield to reason with respect to Eden.

The conviction is thus easily fixed in the mind that right reason and the investigations of science must guide us through the maze of many suppositions about the local origin of our species. Looking attentively at the geographical landscape of antiquity we see that many parts of the earth could *not* have been the place of the beginning. The high regions of the north must all be rejected as unfavorable, not only as the starting point, but also for the development and maintenance of the race-life of mankind. At the time when men began to leave



AN ETHIOPIAN EDEN—ONE OF THE SUPPOSED PLACES OF THE BEGINNING.
Drawn by G. Vuillier.

Scientific inquiry must decide the place of the beginning.

the traces of their activity in the river gravels and caverns of the Old World and the New, our hemisphere was just recovering from the rigors of the glacial epoch. This is to say that then, much more than now, the ice cap around the north pole would keep at bay the beginnings of human plantation and distribution. It is fair to assume that at this time all the continental parts of the northern hemisphere north of the fiftieth parallel of latitude were still under cover of the glaciers. We must therefore look to the more favoring regions of the south, to those parts of the earth which, under the cheering influence of the sun, had more fully recovered from the effects of the long-continued planetary winter, as a suitable scene for the appearance of the first human inhabitants of the earth.

A few general laws and facts of the kind just referred to may serve a good purpose in narrowing to reasonable bounds the field of the inquiry; but within those reasonable limitations there will be found a vast geographical area running through the major continents of the earth in which human life might well have had its origin. If we were left with no better indications than those afforded by geology and geography, we should, perhaps, remain, as we have so long been, blind leaders of the blind in our search for the probable locality of the beginning of man-life on the earth

Large area in which mankind might have originated.

But we are not thus left without support and guidance. Ethnography, ethnology, linguistic science, history, and tradition here become our best and most profound sources of evidence. The dispersion of mankind into races and kindreds furnishes, in a word, a clue for tracing backwards the course of ethnic descent, and with the aid of geography and other branches of science to indicate the original point of departure. Negatively, the very same evidence goes to show from what regions the different families of men have *not* proceeded. We are thus enabled to get upon the track of the inquiry, and to follow it, first historically, afterwards traditionally, and finally by the lamp of right reason to approach, at least, that part of the earth's surface from which only the progressive distribution of the race could have begun.

Recent sciences aid in determining the place of origin.

CHAPTER IX.—TRUE PLACE OF THE BEGINNING.

IT is not our purpose to anticipate any part of what must more properly be said, in a subsequent division of this work, on the primitive migrations of mankind; but it is well in this connection to indicate in a general way the proofs furnished by ethnography respecting the place of the beginning. Take, for instance, the Semitic family of mankind. The Hebrews inhabiting Palestine had been a migrant race. More immediately they had come into the country of their choice from Egypt, but more remotely their ancestral tribe had removed from the Lower Euphrates westward into Canaan. This migration, well preserved in the history and tradition of the Israelites, furnishes an indication of the place,

Migration points to place from which mankind proceeded.

or at least the *direction*, from which the Semitic division of mankind was derived. In North America, within the historical period, we have an example of the migration of the Tuscaroras from south to north—from the Carolinas to the region of the New York lakes. The ancient world is full of the traces of such migratory movements among the primitive peoples. That the Greeks came out of Asia can not be doubted any more than that the Vandals, who conquered Spain and Africa in the fifth century, came out of the North.

The inquirer will not have pursued the subject far until he perceives that the migrations of antiquity, and, indeed, of all time, are governed by general laws, showing the direction and ultimate origin of the ethnic fluctuations by which the earth has been populated. We must not suppose that the first men, the first tribes of men, drifted over the continents under lawless impulses, blown hither and thither like mists before the capricious winds, but that all the transmigrations by which tribes and peoples were carried into new regions of the earth were under the reign of law.

The movements of races are governed by law.

WESTWARD PROGRESS OF THE SEMITES.

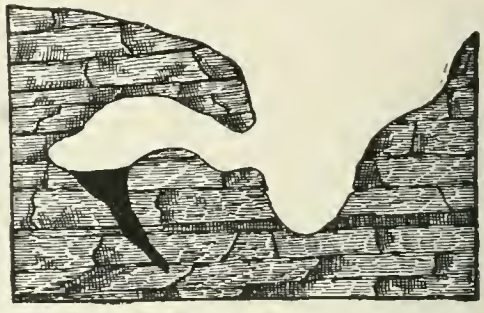
In some instances the motive or impulse of the primitive ethnic distribution may be discovered, and in other cases not so easily. But aboriginal tribes, as well as enlightened people, act by motive and inducement, and not by whim and caprice. We may not

Not whim and caprice but motive decides race conduct.

suppose, for instance, that the original Aryan population of India made its way from the head-waters of the Indus down the river toward the sea, instead of in the inverse direction, by accident or without a motive. Those migrating tribes had a reason and an end, and it was in pursuance of these that they continued to distribute themselves in the country which they and their descendants were to possess for at least four thousand years. The impact of the White race upon the shores of the New World from the side of the Atlantic rather than from the Pacific coast was not by accident, but under the reign of law; not, indeed, that men are mere automatons, but they are creatures of reason and motive; and reason and motive are, as a rule, derived from that general causation and sequence under which the world and its inhabitants exist and go forward to their destiny.

Indications of starting point of human distribution.

We have been able by ethnological research and historical tradition to discover, we might say, a thousand threads in the complicated processes by which the early races of men were distributed in Western Asia, along the African shore of the Mediterranean, and throughout Europe. By following these threads as a clue, we are able to reason both by inclusion and exclusion to tolerably satisfactory theories respecting the starting point of the human distribution. Take, for example, the recently originated theory of a European beginning for the human race. As we have said on a former page, the indications of archæology look rather to Europe than to Asia or Africa as the starting point of mankind. It may be accepted as true that the oldest existing remains of man have been found in the valley of the Somme. But that fact is by no means conclusive on the general question of the local origin of our species. Indeed, the indication is but slight. It signifies no more than this, that no example of the *reliquæ humanæ* older than those of Europe has been discovered in Asia or Africa. But it



SECTION OF EUROPEAN RIVER CAVERN, SUITABLE FOR DEPOSITION OF HUMAN REMAINS.

should be remembered that antiquarian research has had its development in Europe, and that Asia and Africa have in all probability not yet yielded up their most ancient archæological treasures.

Hypothesis of European origin of mankind rejected.

However this may be, the theory of a European origin for the race is confronted and opposed by almost every historical, traditional, and ethnological fact with which we are acquainted. All the races of Europe since the beginnings of history have regarded themselves either as autochthonous or immigrants from the East. The early movements of the European races were all from the line of the Caspian and the Ural in the direction of the Dnieper, the Danube, and the Rhine. We know how powerful within the historical period has been the ethnic pressure from the East in all parts of Europe, and how seldom the ethnic lines have curved backwards from the Atlantic and Mediterranean borders in the direction of their origin. The emplacement of primitive cities and states was nearly always in the *western* parts of the respective countries in

which certain peoples had at length passed from the migrant to the sedentary phase of life. We know that the whole power and contrivance of civilization within the historical period has scarcely been able to withstand the ethnic and cosmic impact of the westward tendency of mankind in Europe.

point unmistakably to an Asiatic origin for the ancestors of the great peoples of Europe and the West. On the other hand, there is not the slightest evidence, from an ethnological point of view, among the peoples of Western Asia that they or any of them, with the single exception of the Galatians, have

WEST ASIAN LANDSCAPE.—SOURCE OF THE ARYAN MIGRATIONS INTO EUROPE.—Drawn by Paul Langlois, after a photograph by Madame Carla Serena.

These remarks apply with unusual fitness to the movements of the Aryan nations. The Indo-Europeans seem to have obeyed the cosmic law—to have felt its force and mandate more universally and profoundly than any other family of men. The whole Aryan tradition and all the testimony of history come, either mediately or remotely, out of the West. Tradition and history indicate unmistakably that the inhabitants of Western Asia, such as the Turcomans, have themselves, like the inhabitants of Europe, migrated from countries further to the East. In short, every fact deducible from ethnographic and ethnological inquiry confirms the

Indo-Europeans move westward under cosmic laws.

belief that all the peoples inhabiting the occidental parts of the Eastern hemisphere are the descendants and representatives of migrant races which were distributed from an Oriental origin at a period far below the dawn of human tradition.

Linguistic science proves Eastern origin of Europeans.

In this connection the history of language may be cited as one of the strongest proofs of an Eastern origin for the races of the West. The discovery of the radical identity of Greek and Sanskrit made by scholars in the first half of the present century is, of itself, a fact sufficient to establish the Eastern origin of the European Aryans. On no other grounds or hypothesis can we account for the fact that the *Iliad*, the *Æneid*, the *Jerusalem Delivered*, and the *Paradise Lost* are written in the same tongue as the Vedas. Either the great Epics, and indeed all literature, mythology, and history of the Western nations have been produced by peoples who had the same ultimate derivation with the inhabitants of ancient India, or else the Hindus themselves have derived their culture, as well as their blood, from some fountain in Europe. The latter supposition can hardly be entertained, and certainly not entertained at all by any one who has acquainted himself with the subject-matter and deductions of ethnology. Indeed, it is certain that the ancestors of the European-Aryan peoples came out of Western Asia, and after long ages of wanderings and wars fixed themselves, by discovery, occupation, and conquest, in the respective countries where their descendants, within the historical period, have grown into great and famous nations. It is certain also that in their westward course in the prehistoric epoch they brought with them the language, laws, institutions, manners and customs, ambitions and mental habitudes which the ancestral tribes had possessed before the beginning of the migratory era.

Ethnic distribution in Africa from east to west.

By a method of investigation and reasoning precisely analogous to the foregoing, we are able to prove that there never was any general migration of primitive peoples out of Africa into Western Asia. It might be sufficient to say that here also the ethnic lines, in so far as they have been preserved by history, tradition, and language, run in the opposite direction. The westernmost parts of the continent of Africa have, as a general fact, been peopled with migratory tribes from the eastern parts. In ancient times the states and cities which abounded and flourished on the southern shores of the Mediterranean were planted progressively from east to west. Egypt was the oldest of all. Carthage was one of the younger plantations of that region of the earth. In the westernmost parts of Africa the ethnic lines have been sometimes doubled back by the barriers of mountain and sea, just as in Europe the Celtic race, having explored and to a certain extent peopled the southwestern peninsulas of that continent, doubled back and proceeded far to the east before the close of the age of migrations. But it is clear to the student of these exceptional movements that they were made against, and as it were in the face of, the cosmic and ethnic law by which the primitive tribes had been carried from their Asiatic origin into the West.

If the study of peoples of Western Asia in ancient and modern times should bring us into contact with Ethiopian and Nigritian tribes—if we should find in certain places the distribution of Black men of the ethnic type peculiar to Equa-

torial Africa, speaking the languages of that region and having their manners and customs—we might well suspect that there had been at some time in the past a race movement from the direction of the Red sea backwards toward the Caspian, the Persian gulf, and the borders of India. But no such evidences have been discovered. On the contrary, the impingement of Asiatic races upon the African coast as far south as the equatorial region is a fact everywhere attested. The movement of mankind in this region has been from the Persian gulf toward the Red sea and Abyssinia. Indeed, we can see dimly through the prehistoric shadows to the time when, probably six thousand or eight thousand years before the Christian era, the ancestors of the Egyptians themselves made their way into the valley of the Nile, out of Asia, became sedentary in that favorable situation, and planted there, after a long period of development, those first famous dynasties which mark, like far-off mountain peaks, the extreme verge of the historical horizon.

No Blacks in Western Asia; Egyptians from the East.

Again, should we begin an inquiry in regard to the Mongoloid races, we should find them pressing from the interior of Central Asia eastward toward the Pacific. The older divisions of this race are inland peoples rather than maritime. The maritime and insular families are more recent. The Japanese are younger than the Chinese, and the Polynesian islanders are of later date than the continental Mongoloids, from whom they are descended. We must therefore accept the conclusion that the general diffusion of the eastern Asiatics has been from the direction of Central Asia toward the Pacific, and that the ethnic movement has been strong enough to carry the vanguard into peninsular and insular situations far removed from the original seats of the race.

Mongolians move eastward from Central Asia.

The principles of ethnology and linguistic inquiry applied to the Black races give similar results. These races are found only in Central and Southern Africa, in Melanesia, and Australia. As to Africa, the ethnic distribution, as far as it has been discovered and traced, is from the eastern coast into the interior, and as far west as to where the continent becomes almost peninsular in the direction of the Cape Verde islands. The theory of a European origin for the race of man is scientifically contradicted by the present distribution of the Nigritian peoples, and by the direction from which the diffusion has been effected. In like manner it would be impossible to find any European stem to which the native Australians and Melanesian islanders can be referred—this for the reason that there are neither ethnographical nor linguistic traces of such peoples between the countries which they now occupy and the borders of Europe.

Nigritian dispersion contradicts theory of European origin.

The same may be said also of Asia—unless, indeed, we should except the extreme southern parts of Hindustan. There, indeed, are found the Veddahs and other descendants of a race belonging, ethnologically, to the same branch with the Negroes and the Melanesians. There is, in a word, *no continental origin* which can well be assigned for the Black races, unless we should fix the same within the equatorial belt on the eastern coast of Africa. From that point, indeed, the Nigritian peoples may all be derived with a fair conformity to science and right reason. At the same time, however, there would appear to be insuperable objections to this lo-

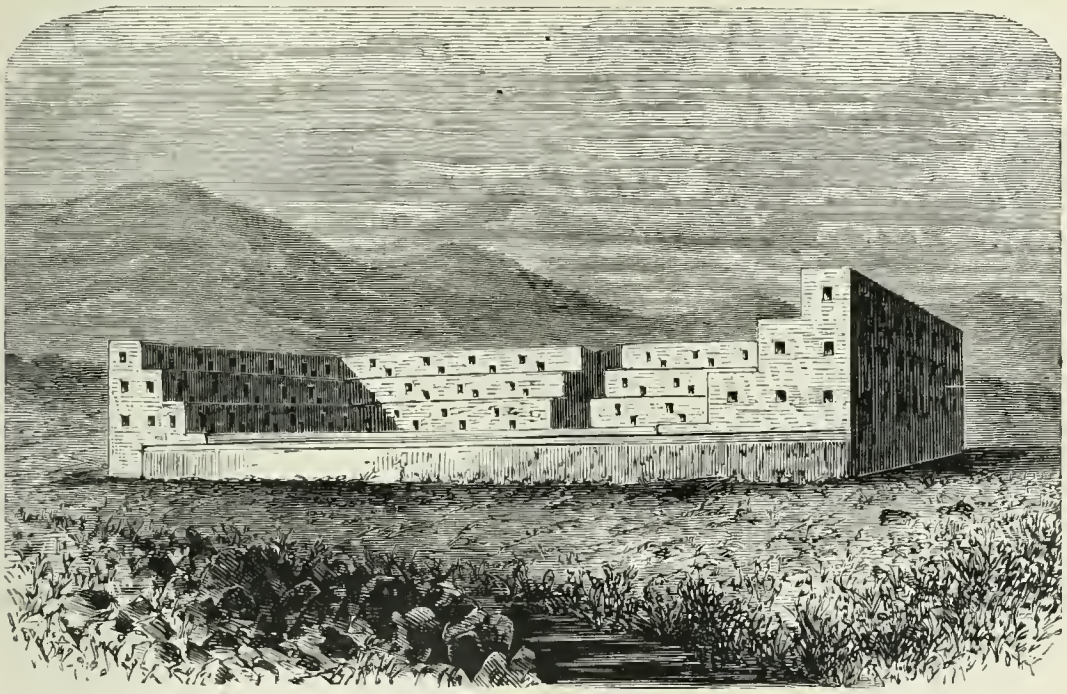
No continental point for distribution of Black races.

OFF THE COAST OF EASTERN ASIA.—Drawn by Taylor, after a sketch of Berttolty.

cality as the original nidus of the Black races. For in order to deduce from such a situation the natives of Australia and Melanesia, the original stock must have crossed the Indian ocean through several thousand miles—a hypothesis hardly tenable under the law of probabilities.

If, moreover, we allow a great antiquity for the Black races, and fix some spot in Eastern Africa as the point of their departure, we are at a total loss in so-called Caucasian, or White, variety of the human species from an original seat *in Africa*—this whether we call that original seat by the name of Eden and surround it with the circumstances of the terrestrial Paradise, or view it merely as the locality from which the tool-making, fire-kindling, anthropoid ancestors of mankind arose and took their departure to people the world.

Analagous reasoning may be applied



EVIDENCE OF PREHISTORIC RACES IN AMERICA.—(1) BUILDING OF THE PUEBLOS, RESTORED.

attempting to derive therefrom the great Brown peoples of Eastern Asia or the Ruddy races of Western Asia and Europe. If we should establish the origin of the Black race in the continent, where it now displays itself in great diversity and power, then we should be obliged to abandon the monogenetic theory of the origin of mankind and agree that the Black races are of one ultimate stock and the Ruddy races of another. Of a certainty it is not possible to derive the with the same results to the supposition that the American continents may have been the original home of man. To this hypothesis the deductions of almost every branch of science are opposed. As to the White race and the Black race we know the dates of their arrival on the shores of the New World. While there are evidences in all the three Americas of the great antiquity of the aboriginal peoples who occupied and, to a certain extent, civilized the milder and more favorable

Brown Asiatics can not have an African origin.

American continents not the first home of man.

regions of the western hemisphere, there are no other than the most visionary reasons for supposing that the great historical peoples of Asia, Africa, and Europe were derived therefrom. The habits, manners, customs, arts, and physical characteristics of the original Americans —by whatever names we may define them—ally them with the Mongoloid divisions of mankind, and suggest with great emphasis a derivation by way of the northwest out of Asia, or by the Polynesian islands to South America. But to

EVIDENCE OF PREHISTORIC RACES IN AMERICA—(2) PYRAMIDAL MOUND IN MEXICO.

draw outward across the oceans from any part of our three continents the lines of ethnic distribution, and to carry them to Europe, Africa, or Asia, is to contradict every principle of ethnography, and to run amuck with all the facts which science has discovered relative to the earliest inhabitants of the continents round about our own.

Upon the known direction of primitive migrations we may plant ourselves firmly in this inquiry. When a given race of the prehistoric times has come by long descent and removal from a given point of the horizon, we may look confidently in that direction in the hope of discovering a region of general ethnic dispersion—this always upon the hypothesis that all the races of men are of one common ultimate derivation. But the inquirer, in following backwards as far as he can with fact and theory the lines of ethnic distribution, is likely to come upon many confusing and some seemingly contradictory evidence. Nothing in which man has been concerned is regular or mathematical. Life has its order and its law; but it is the order of freedom and the law of variation. The calculus by which the movements of all living organisms, particularly those which are rational, are governed, is vastly more intricate than that in which are expressed the mathematical laws and principia governing material nature. The inquirer, however, in considering the movements of the primitive races of men, is as likely to be aided as he is to be confounded with the irregularities and ostensible lawlessness which appear in certain parts of the problem.

Direction of migrations a clue to point of origin.

In no other part of the question is this fact more noticeable than in that relating to the general directions of the movements of mankind from Orient to Occident. At first glance we should easily conclude that the proper course of the human race had always been, as indicated above, from east to west. This is, indeed, one of the most tangible circumstances that presents itself to the ethnologist. We should say at the first that all men and tribes and peoples naturally follow in the course of the sun from his rise to his setting. Undoubtedly the

General movement of the races from east to west.

whole of Europe, and, indeed, all of the Mediterranean countries have been populated in accordance with this cosmic law. So, also, in America, leaving out of view the aborigines, we note the tremendous pressure of the White races from the eastern to the central and western parts of the continents.

It would be a mistake, however, to suppose that all ethnic movements have been in like direction. Inanimate nature shows many exceptions to the general disposition of vines and tendrils to adjust themselves from left to right around the objects to which they cling. Some vines and tendrils turn the other way. The ethnographer, following his clues eastward across Europe and Western Asia, comes at length to a region where the lines seemingly enter the earth, and where others springing up depart *in an easterly direction*. By careful study from north to south through this region of the earth he finds the recurrence of the same phenomena. In a word, he is unable to trace further the footmarks of the Aryan races. It is natural, and, indeed, necessary, to the prosecution of the inquiry that this particular belt from which the lines of ethnic transmission seem to depart to right and left, that is, to east and west alike, should be examined with great care.

Exceptional movements of man and nature against the sun.

If the observer take his position on the northern shore of the gulf of Oman and look straight across Asia in the direction of Nova Zembla, he will have before him a continental line which will approximately coïncide with a sort of ethnic watershed in the history of mankind from which the races have flowed to right and left in the original distribution. Of a certainty this statement is not scientifically exact. There will be found much twisting and turning after the manner of streams that take their rise, flowing in their upper courses in many directions rather than in one, until a heavy volume has been acquired and a definite course determined. But, on the whole, that belt of Asia lying between the fiftieth and sixtieth parallels of longitude east from Greenwich will be found to contain the fountain heads, as far as the same have been discovered, not only of the Europic-Aryan races, but also of the vast Indic and Iranic-Aryan families, as well as the still more widely distributed Mongolian families by which the larger part of Asia, Polynesia, and the aboriginal Americas have been peopled.

Watershed between westbound and eastbound races.

EVIDENCE OF PREHISTORIC RACES—(3) RUINS OF TEMPLE, IN TITICACA IN AMERICA.

The geographical belt in question coincides roughly with the line of the river Ural, the Caspian, the division of modern Persia centrally from north to south, the Persian gulf and its outlet into the Arabian sea. So far as ethnological research has extended, it may be averred that all the primitive races departed from this belt in their primal distribution in an easterly or westerly direction. It was only after the migrations of the Mongoloid races had carried them to the eastern borders of the continent against the Yellow sea, the sea of Japan, and the sea of Okhotsk that the lines of ethnic diffusion were bent backwards in a westerly direction across the northern and northwestern parts of Asia. In like manner from the same meridian the migrations of the European Aryans were always to the west, with only such exceptional deviations and reflections as may be accounted for by geographical contingencies and the vicissitudes of discovery and war.

Primitive races depart right and left from a common belt.

So also were the Semitic and the Hamitic families dispersed from the same belt of the earth's surface. If we press the inquiry further we shall find the first appearance of the Black races on the eastern coast of Africa, in the southern part of Hindustan—the former moving in a western direction and the latter in an eastern—showing conclusively that the Black division or divisions of mankind also departed to right and left from a meridian almost identical with the watershed of the White and Brown races across Asia. It is hardly pressing the hypothesis beyond the warrant of established facts to say that within the belt of land and sea bounded by

All non-Aryans have the same line of departure.

LANDSCAPE OF ETHNIC WATERSHED.—Mountains of Jobla.—Drawn by G. Vuillier.

LINE OF THE ARYAN WATERSHED.—Region North of the Caspian.—Drawn by Moynet.

the fiftieth and sixty-fifth meridians of longitude east from Greenwich the first fountains of man-life in the earth are to be discovered.

Under this hypothesis it still remains to be decided *in what part* of the belt referred to, viewed from north to south, the primal seats of mankind are most likely to be found. First of all, we may exclude the north. Nothing is more clear than that the races now inhabiting the region north of the Caspian, including the countries drained by the Ural and the Volga, have made their way into those semiarctic countries by toilsome and comparatively recent migrations. We have every reason to believe that the Kirgheez, the Calmucks, the Cossacks of the Don, and the Russian Mongols in general are newcomers in the countries which they now occupy.

Recent arrival of the supra-caspian races.

Hereafter we shall see that man, as an animal, was not in his primitive state adapted to the rigors of such situations as those lying between the Caspian and the White sea. Into such regions he had to make his way slowly, fortifying his constitution as he went, and learning by much discipline and experience how to protect his body from the inclemency of the natural world. We may, therefore, reject the transcaucasian and supracaspian region from the list of places to be considered in the inquiry.

Primeval man ill adapted to northern rigors.

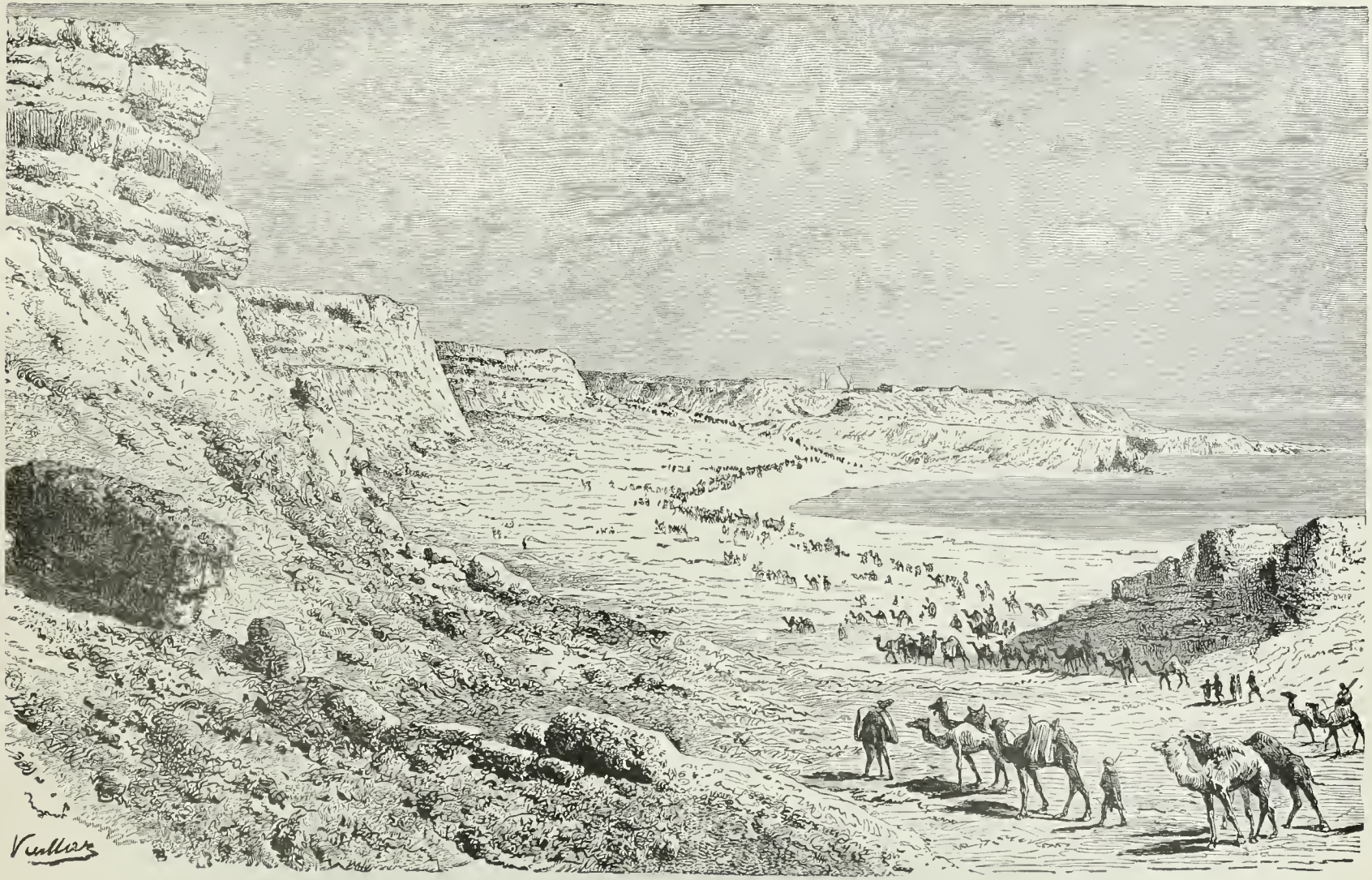
To this conclusion we are also led when we consider the impossibility of tracing the Black and Brown races to such a geographical locality. The derivation, for instance, of the Negroes, Australians, and Papuans from a country above the fiftieth parallel of north latitude is a thing contradicted by every fact with which we are acquainted and by every principle of right reason. Moreover, the races just referred to are much lower in the scale of physical, intellectual, and moral development than are the great Indo-European families of men; from which fact we must either suppose that the Black races have been derived *by an inverse order of descent*, involving retrogression and reversion toward the lower order of animals from the higher races of the north, or else reject altogether the possibility of a northern origin for the native inhabitants of Central Africa, Australia, and Melanesia.

Impossibility of deriving Black races from the North.

We are thus drawn down from the subarctic regions to the consideration of the countries lying between the Caspian and the Arabian sea. It is to this part of the earth, as we have already said, that the ethnic lines of the Aryan races seem to be traceable. The latitude coïncides with that great belt of our globe, running from east to west, in which the energies of those races have been so magnificently displayed. It is a region presenting those climatic vicissitudes under which the best discipline and most vigorous development of the human race have been achieved. As we have said above, the lines of Aryan descent do seem to arise from the ancient Iranian region under consideration, and to depart to both east and west, as might be expected, if this were the starting point of human development. Limiting our view, therefore, *to the Aryan races only*, we might well believe that we had discovered in the region north of the Persian gulf and included between that water and the eastern extension of the Caucasus the original home of man.

Region between Caspian and Arabian seas indicated.

This supposition, however, is again confronted with insuperable difficulty



LINE OF DIVISION BETWEEN RUDDY AND BROWN RACES.—Coast of Arabian Sea.—Drawn by G. Vuillier.

when we take into consideration the races other than Indo-European. There have never been discovered in the countries south of the fiftieth parallel and west of the sixtieth meridian the slightest trace of the Mongoloid families of men. North of the Caspian and the Black sea Mongols are abundantly distributed; but on the plateau of Iran, from which Aryan life appears to have taken its rise, no vestigia of Mongoloid existence have been found. Still more is this true of the Blacks. The Nigritians have nowhere risen above the twentieth parallel of north latitude—except, indeed, in countries like the United States, where the presence of the Blacks is to be accounted for on other than ethnic principles. If we attempt to deduce the Black races from what appears to be the Aryan nidus in Bactria, we are confronted with the same insuperable difficulties mentioned above. The Black races have not advanced as far along the lines of the human evolution as the so-called Caucasians. Their physical structure, their intellectual compass, and their moral attributes are all clearly of a more primitive and less specialized form of life than we find in the peoples of Western Asia and Europe. There must, therefore, have been retrogression in the case of the Blacks, or else a derivation from some region lying approximate to the equator. There has not been retrogression.

Mongolians and Blacks not derivable from this region.

It would thus seem to be impossible to find a position on the land surface of the earth, as the same is now distributed, from which the Black, the Brown, and the Ruddy races can be derived as from a common original home. Indeed, it is impossible to make such derivation; but when this is said, the limitations of possibility are determined by the resources of our present knowledge. It is altogether correct for the inquirer to use such language in the present age and at the present stage of human attainment. But it is not meant that it is absolutely beyond the boundaries of the possible that the Ethiopians and the natives of Australia should have been derived from some point on the continent of Asia. Such conclusion, however, appears so strongly impossible, and is so immensely improbable, that we are warranted in adopting the expression, and in rejecting altogether the supposition of an Asiatic origin for the Black races of mankind.

No land surface answers the demands of the problem.

What then? If the Aryan races have not been derived from Africa or Australia, as they have not been; if the Brown races, the great Mongoloid divisions of mankind, have not and can not have had an African origin; and if they have not been found, even by trace or tradition, as far west in central and southern Asia as the seat of the Indo-Europeans, must we conclude that the discovery of a common primitive home for the first men of the human species is impossible, and must we adopt the theory of a multiple origin for the different races? Not at all. There still remains a single view which, if adopted, may make consistent the theory of monogenesis and progressive distribution with what we know of the present ethnic position and former migrations of the various peoples of the earth. This view is in brief, that the geographical distribution of land and water in that quarter of the earth from which it would appear that the human race has taken its origin may not be, and in all probability is not, the same as it was at the date of the appearance of man.

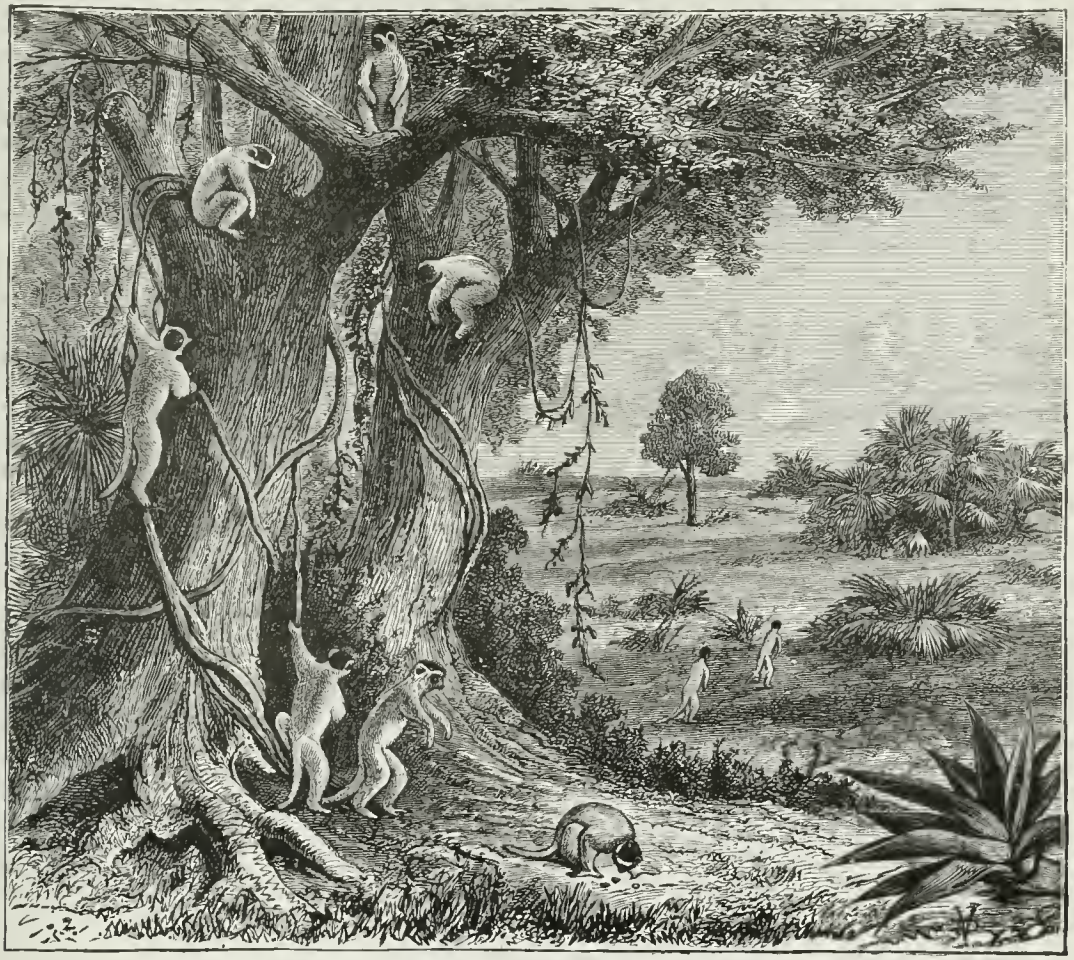
Tenability of another hypothesis.

There are many grounds for believing that the water area now occupied with the Arabian sea and the northern parts of the Indian ocean, including Madagascar and extending eastward almost to Australia and the Malay peninsula, was formerly a continent upon which the ocean gradually encroached until its submergence was effected. If this suggestion were made with a view merely to furnish a possible common home for primitive mankind, it might at once be rejected as a part and example of that visionary reasoning in which dogmatic scholarship has so much delighted for several centuries; but the existence of a great submerged continent in the region referred to is rendered probable, if not positively established, by several kinds of inquiry having no reference to ethnological results.

Grounds for believing in a submerged continent.

In the first place, the shoal character of the waters of the greater part of the Indian ocean is a well-known fact of marine geography. That part of the ocean between the thirtieth degree of south latitude and the equator bounded east and west by Madagascar and the eightieth meridian from Greenwich is very shoal. Should we take our stand on the island of Mauritius or Rodriguez, we should see around us a vast area of

Shoal character of Arabian sea and Indian ocean.



IDEAL LANDSCAPE OF LEMURIA.—Drawn by Riou.

shallow sea. Even beyond the borders of this the waters are not deep like those of the profound Pacific. A comparatively slight recession of the ocean such as we may well suppose to occur in one of those secular movements to which the fluid surface of the earth has been many times subjected in the past, and which we know to be actively in operation—though slowly—at the present time, would be sufficient to lay bare a continent much larger than Australia in the region between the Malay archipelago and the eastern coast of Africa.

The former existence of such a continent is attested by many proofs. Among these may be mentioned with confidence the distribution of animals and plants on the two sides of the Indian ocean. The birds of Madagascar and those of the Malay peninsula are of a common type. Certain species of palm trees, which are disseminated with great difficulty by seed or transplanting, are common in Singapore, the Moluccas, New Guinea, Australia, and the western islands of Polynesia. Botanists of great reputation have insisted that this distribution could not have been made *without a continuous land-bridge* among the countries where this species of palms is found.

Evidences of former existence of such a continent.

LANDSCAPE IN BELUCHISTAN.—DEPARTURE OF THE BROWN RACES.

In like manner the conclusions of geology are at least consistent with the former existence of a continent in what is now the bed of the Indian ocean. Geology recognizes clearly two secular processes by which a continent existing in this region could have ceased to exist by emergence under the sea. One of these is the settling, or sinking, of the low-lying tropical lands in question below the level of the ocean. The other is the encroachment of the sea by one of those vast fluctuations of the presence of which in geological time there are many indications.

Geological indications of the same fact.

Still another consideration worthy to be weighed in the argument is the fact that the human race must have had *some* geographical starting point on the earth. The area from which mankind began to be distributed may have been larger or smaller; but the very necessity of the case requires us to select some locality as the probable home of the first men. Thus much granted, the locality must answer to the hypothesis. It were vain to select some place from which the various races could not have been derived. This kind of reasoning is strictly scientific. The search must be for some situation which will answer to the conditions and the facts as they now appear. If we may find any region on the land, or even the water surface, of the earth toward which the indications of ethnography, philology, anthropology, history, and tradition all alike point as to a locality from which all the varieties of men might have been diffused, this fact of itself becomes a powerful argument in favor of that locality. Indeed, it is this particular reasoning which has

Place of man's origin must answer to some hypothesis.

HOFFMAN'S SLOTHS.
After a drawing from life.

brought us at length to the conclusion that the most probable locality in which to establish the first seat of the human race *was in a continent now submerged beneath the Indian ocean.*

Ethnic outlook from the supposititious continent.

If we accept such a hypothesis, the whole question begins to clear. The existence being granted of such a continent, to which we may say, once for all, that the name of Lemuria has been assigned, we are able to look out, as it were, along the lines of the primitive dispersion of mankind. To the west we may note the departure of the Nigritian stem, the presence of which is historically discovered first of all on the mid-eastern coast of Africa. To the east we may remark in like manner the divergence of another line of Black men whose presence we find within the historical period on the northwestern coast of Australia, in New Zealand, and in the extreme south of Hindustan. Without changing our position we may perceive with fair probability the departure of the pre-Mongolians in the direction of Beluchistan or Western India, for in these countries the first traces of Mongoloid life are discoverable. Lastly, we may imagine a Dravidian line of ethnic descent carried almost in the same direction with the pre-Mongolian, upon which, in Beluchistan or Eastern Persia, we may place the primal development of the Ruddy, or White, race of mankind. All of these suppositions are cited in this connection not because they include established facts, not because they represent scientific knowledge of the first distribution of men, but because they do furnish a consistent basis for such an inquiry and harmonize, as is believed, in every part with the present results of investigation, and accord with what may be called the necessities of the case.

BRUSH-TAILED ROCK KANGAROOS.

But we are not left entirely to reason and conjecture as it respects the fixing of the primitive seat of the human race

in Lemuria. Much scientific evidence may be adduced to strengthen the hypothesis. In the first place, man is originally a tropical animal. The very least that can be said is that he is by his nature semitropical in constitution and habits. We are obliged to select for him an original habitat corresponding with these conditions. Let us remark, once for all, that where these conditions have been maintained, there the race has invariably made least progress from its original state. The lowest forms of man-life are tropical. The most original types are found in those regions where the environment has prevented the evolution of the higher human varieties. In a word, the life of man seems in the tropical situation to have continued *on the original plane*, with little variation under the influences of physical nature.

The nature of man points to a tropical beginning.

Not so, however, with those peoples who have departed from the original environment. As soon as the unclothed primitive man, covered with his delicate skin, made his way from his warm and equable climatic surroundings and began to be exposed, first to the vicissitudes, and further on to the rigors of higher latitudes, he began to acquire the discipline of nature, to be specialized in his faculties, quickened in his energies, and strengthened for battle with the opposing forces of the material world. With this he began to rise in the scale of existence. The extreme distance of his departure is now measured by the span between the Papuan and the German.

Development coincident with progress from point of origin.

The significance of these facts is that human life began from some region where tropical or semitropical conditions prevailed, and that its progress has been coïncident with its departure into regions where the warfare of nature and the struggle for existence have developed and symmetrized the body, awakened the mind, and produced by complexity, reäction, reflection, and the evolution of conscience the higher phenomena of the moral life. Limiting our inquiry to the period of geological time this side of the last glacial epoch, the conditions favorable for the beginnings of our race life can be found only within the tropics, or at least close to the Tropic of Cancer; not above that line. The distinction between a situation favorable for the unaided *beginning* of the first men and the situation most favorable to the *development* of the race into hardihood, activity, and greatness, must be constantly borne in mind.

Conditions favorable to beginning unfavorable to development.

We are thus led by many lines of suggestion and argument to select as the probable home of the ancestors of the human species the countries now overwashed by the comparatively shoal waters of the Indian ocean. It is proper to say that such a conclusion is not absolute and final. Further investigation may possibly show us another way; but it is not probable that the conclusion will ever be displaced by a different hypothesis or seriously modified by subsequent investigation. It is a principle of science that that hypothesis which explains a given group of phenomena, which contradicts none of the facts and is consistent with all, passes, at least tentatively, into the theoretical phase of knowledge; and this is at the present day the condition of the inquiry with respect to the primal seat of mankind in the Lemurian continent.

Conclusion of a Lemurian origin not final.

We may not, however, pass from the proofs which are adducible in favor of this conclusion without citing the strong argument drawn from the distribution of the primate animals. If we strike a cir-

cle around the shores of those waters which now cover the Lemurian continent, we shall find strong evidences of what may be called *a zoölogical climax* in the area covered by the Indian ocean. The view here taken includes the whole earth. There is in general *a gradation of animal life upward from the horizon toward this region.* If we approach the so-called Lemuria from any point of the compass, west, north, east, or southeast, we shall find the animals graded up toward man, as though somewhere in this region he stood on the apex of all life. The zoölogical conditions of the primitive world seem to have been such as to make the appearance of man in any other quarter than in the tropical Orient impossible—unless, indeed, we suppose the uniform gradations of animal life to have been suddenly broken and reversed in the case of man by his displacement in time and locality from that region of the earth where the other forms of animate existence had been most highly developed.

Gradation of animal life upward toward Lemuria.

A glance at a few facts and principles of zoölogy may serve to show the force of these deductions. Australia is the native home of the marsupial animals. These are the lowest in the scale of the hot-blooded creatures with which the human species is particularly associated. True, the marsupials are widely distributed in other quarters of the globe; but it is evident that their presence in foreign parts is, as it were, at the extreme of zoölogical lines which are central in Australia. In the next place, the South American continent is the primal seat of the edentates, or toothless animals, which are next in order of development above the marsupials. Primitive North America was the home of the herbivorous animals, which are third from the lowest in the evolution. The tropical Orient is clearly the native seat of the great carnivora, which are one stage higher than the herbivora in the scale of development. As in the case of the marsupials, so also the edentates, the herbivora, and the carnivora are of world-wide distribution; but the density of the several orders, as well as their multiplicity and high development in the respective situations indicated, points to those regions as the zoölogical centers of these different orders of life. In a word, Australia is on the lowest zoölogical plane, South America next, North America third, and the Oriental countries within the tropics fourth in the ascending scale.

Illustrations of the rise of animal life toward this center.

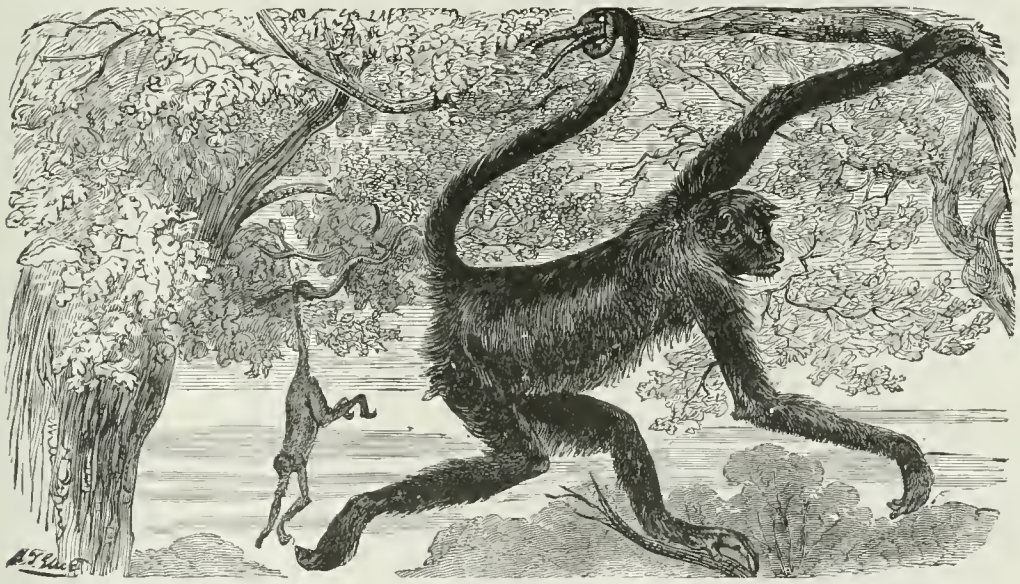
The argument is strengthened in an especial manner when we come to consider the distribution of the primates, or of those forms of animal life next to man. This subject has been investigated with great care by the English naturalist, Wallace, and the American palæontologist, Winchell—by the former, in his work on the *Geographical Distribution of Animals*, and by the latter in the preparation of the materials for his *Preadamites*. For the purpose of making clear their reasoning, the earth has been divided into several regions to which specific names are given as an aid to understanding the distribution of the primates throughout the world. The first division, including Europe and Asia, except the Malay peninsula, Hindustan, Southern Arabia, and Africa north of the Tropic of Cancer, is designated as the Palæarctic region. The remainder of Africa, including Madagascar and the adjacent islands, is called the Ethiopian region. The Oriental region includes the Malay peninsula and islands, Hindustan, and Southern Arabia. Aus-

Primate animals in particlar culminate around Lemuria.

tralia, Polynesia, and New Zealand are defined as the Australian region. South America, the West Indies, and Mexico as far north as the tropic, constitute the Neotropical region, while the remainder of North America is defined as the Nearctic region. The problem is with the map thus adjusted, to determine by orders, suborders, and families the distribution of the primate animals.

Place of supposed continent between Ethiopian and Oriental regions.

which we have fixed upon as the probable home of the first men, was held in between the two approximate parts defined in the above table as the Ethiopian and Oriental regions. A glance at the synopsis will show the astonishing preponderance of the primate animals in those countries. True, the largest single distribution is that of one hundred



AMERICAN MONKEY WITH PREHENSILE TAIL.

The following table prepared by Winchell contains an abstract of the results:

DISTRIBUTION OF PRIMATE AND CARNIVOROUS ANIMALS.

No. of Families.	Palæarctic Region.	Ethiopian Region.	Oriental Region.	Australian Region.	Neotropical Region.	Nearctic Region.
Apes	..	2	10	..	..	..
Old World Monkeys	1	11	28	..	..	.
Baboons and Macaques	4	42	23	2	..	.
American Monkeys	..	..	..	..	81	..
Marmosets	..	..	..	..	33	..
Total Anthropoids	5	55	61	2	114	..
Lemurs	..	49	4	..	..	.
Tassiers	..	..	1	1	..	..
Aye-ayes	..	1	..	..	..	..
Total Lemuroids	..	50	5	1	..	..
Total Primates	5	105	66	3	114	..
Carnivora	65	90	95	..	48	43
Total Primates and Carnivora	70	195	161	3	162	43

It will be remembered by the reader that the supposed continent of Lemuria, and fourteen species in South America; but it has been noted that the South American primates are much lower in order of development than are those of Southern Asia and Eastern Africa. No apes or any of the higher primates have been found native in any part of the New World. Leaving out, therefore, from the count the South American monkeys and marmosets, which are the very lowest of the anthropoids, we have the primates virtually limited to the southern parts of Asia and the tropical parts of Africa.

The same is true of the lemuroids, which are found only in the Ethiopian and Oriental regions, with the single exception of one species of Tarsiers for

Australia. In the case of the carnivora there is, in the regions just named, an excess of fully fifty per cent over the number of species found in any other great division of the earth. From all of which we note conclusively and emphatically the climacteric tendency of all the higher forms of life, most particularly of the primate animals toward the basin of the Indian ocean. On the hypothesis that the bottom of this comparatively shallow sea constituted in prehistoric ages a low-lying, tropical continent—reaching on the one hand to the Asiatic peninsulas, and on the other to the coast of Africa—we are able to see with strong probability in this region an apex of the animal evolution, and near that culmination the ancestors of the human species.

Lemurs and Carnivora increase toward Indian ocean.

GROUP OF LEMURS.

The argument is intensified when we estimate the character of the human species round about the seeming culmination of the lower orders of life in the Lemurian region. While these orders, as we have seen, rise to an apex in the direction of the Indian ocean, the human species *fall off inversely in the same direction.* This is said of the general character of the different races as measured by the extent of their departure from Lemuria. Instead of finding the highest type of men heading in the direction of the hypothetical continent referred to, thus following the trend manifested by all the lower orders of animals, the law in the case of man is totally reversed. If we seek for the very lowest types of human beings, we must do so among the Papuans and natives of Australia. After these, we must look to Africa for the next in order of ascent. Thence we should have to consider the native races of South America, and from these might proceed to the aborigines of our own continent; thence to the Polynesian islands, and to the races of Eastern and Northern Asia; finally to the Aryan division of mankind, with its magnificent development in such groups as the English-speaking, French-speaking, and German-speaking families.

Mankind falls off inversely in the same direction.

The course of this excursion is manifestly outward from the region of Lemuria. Certainly the diagram is far from perfect or exact; but in general the rise of human life, as estimated by its elevation and proficiency, seems to have been from that precise quarter of the world toward which the lower orders of animated nature ascend to a climax!

Lowest dip of humanity and highest reach of animality.

This is to say that at the lowest geographical dip of the human species it seems to touch the highest lift of the subordinate orders of living beings! Where the highest of the lower primates reach their culmination, there the lowest of mankind take their rise. It is as though the noblest of the anthropoids should from the sunken continent hold out his right hand to touch the left hand of the most ignoble of human kind.

As in the search for the time of the beginning, so in that for the place of the beginning there must be, in the present state of human knowledge, a considerable margin left for uncertainty. The reader in pursuing such inquiries must remember that all sciences are divided into the exact and the inexact. Knowledge on the one hand is absolute and demonstrable, and on the other probable and approximate. Nearly all deductions relative to the movements, character, and

Place of origin conjectural rather than exact.

FAMILY OF GORILLAS.

circumstances of the human race in the prehistoric ages have in them considerable elements of doubt and perhaps of positive error; but we are not by any means to place less value on that kind of knowledge which we are able to gain concerning the first estate of mankind—its time, its place, its circumstances—than if we might apply thereto the formulæ of exact science.

Perhaps the human mind would rest in a state of greater satisfaction to know more precisely the date, the locality, and all the concomitants and conditions under which our ethnic career began. Nevertheless, exact knowledge has its discounts and defects in the treasure-total of our mental wealth. It may be observed that the exact sciences, while they have a vast and salutary effect upon the mind in correcting the judgments and decisions of the intellect, nevertheless tend to reduce all mentality to a formula and mathematical equation. At the same time they tend to weaken by disuse the ideal faculties, to benumb if not destroy the fancy and the imagination, and thereby diminish that excursive power of the mind upon which the discovery of truth and beauty has so greatly depended. It is not desirable that conjecture, uncertainty, and doubt should be removed from the concepts which we form of ourselves and of universal nature, else the dream of the artist and vision of the poet might cease to add their gifts to the treasures of humanity.

Philosophical advantages of uncertain knowledge.

BOOK II.—MANNER OF THE BEGINNING.

CHAPTER X.—FIAT AND EVOLUTION.

WE have now looked with some attention at the great questions of the approximate date and probable place of the first appearance of man-life on the earth. It remains to consider the still more interesting problem of the mode of man's appearance—of the process, or processes, the *manner*, if we may so say, of his coming. Here at the outset we are confronted with the same difficulty which arose in the previous investigation relative to the time and place of the birth of mankind, namely, the inability of men themselves to testify respecting the circumstances and conditions precedent to the unfolding of consciousness. This is true in the individual life, in the life of the tribe, in the life of the people, in the life of the human race. Consciousness began; but neither perception nor memory is able to pierce the oblivious conditions which preceded the conscious state, or to give more than imaginary testimony with respect thereto.

Inability of mankind to testify of the unconscious life.

A still more formidable difficulty arises from the preconceptions and deep-set opinions which men of every age and race have formed with regard to the circumstances of their origin. Among almost every people there has been a sort of national faith, involving, first of all, the circumstances of the genesis not only of that people, but of mankind. The belief in some particular *manner* of the appearance of the race has been interwoven with the philosophical, social, and religious systems of the various peoples, sometimes forming a part of the political constitution, and always opposing itself with persistent conservatism to such investigations and excursions of thought as might seem to disturb the existing order. To the present time it has continued to appear to the great majority of the most enlightened peoples that a certain interpretation—accepted from the wisdom of the fathers—respect-

Preconceptions impede the freedom of investigation.

ing the nature and circumstances of the origin of mankind is essential to the steadiness, welfare, and spiritual elevation of the civilized life.

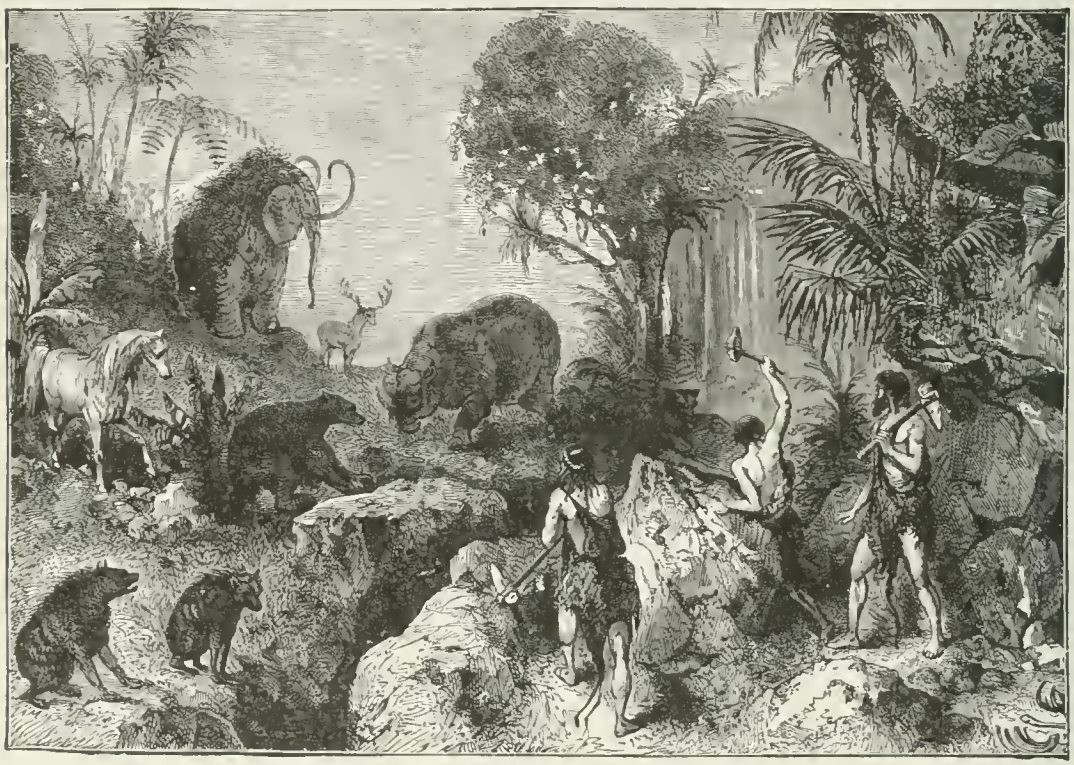
Statement of the two divergent views; phenomenal creation.

Without pausing to discuss the validity of such opinions, we may proceed at once to an analysis of the divergent views which have been held with respect to the manner of the beginning. There are two general beliefs on this subject:

1. That the world, with all forms of life existing thereon, was created by the fiat of the Almighty; that the different species of vegetable and animal existence were produced at once and phenomenally by the agency of an intelligent power over and above the world and apart from it; that the work of creation occupied but a brief interval of time; and that the various kinds of living creatures appeared under the creative act in perfected form and stature as new existences without ancestry, strangers, so to speak, to the planet upon which their activities were to be displayed and their descendants multiplied and disseminated.

Evolution would account for living forms by growth.

2. That the world and all its forms of life are the result of the process called evolution, or growth; that the different species of animals and plants now abounding on the surface of the globe and in its waters and atmosphere sprang from a few primordial germs, or possibly a single seed of life, endowed with the power of development, differentiation, and adaptation to environment; that the germs of life from which all living forms are descended were existent in the world at a period almost infinitely removed from the present; that the processes of evolution by which the existing forms of organism have



MANNER OF MAN'S APPEARANCE.—Drawn by Riou.

been produced have extended over an incalculable lapse of time, working out their results slowly, tortuously, and painfully, but preserving by survival of the fittest the best forms from age to age, thus yielding at last by the struggle of life and by natural selection the approximately perfect species of the present age.

Concerning these two widely divergent views several important observations may be made. In the first place, they have interested and divided the great thinkers of the after-half of the nineteenth century more profoundly than any other question whatsoever. Secondly, it may be remarked that in general the scholastic, conservative, and religious elements among the civilized peoples have mostly espoused and held to the doctrine of phenomenal creation, while scientists and progressive thinkers have adopted the theory of evolution. Thirdly, and very importantly, it should be observed that the fundamental difference between the two opinions is simply one of *modus operandi*. The evolution hypothesis does not account for, and has never undertaken to explain, the origin of life, but has limited the investigation to the *manner* by which from certain primordial germs the existing races of plants and animals may be accounted for.

Paramount interest and general tendency of the question.

There is thus a common ground which has been greatly overlooked between the creationists and the evolutionists—for both begin with the hypothesis of life. The difference, therefore, takes the following form: That the doctrine of immediate creation lays great stress upon the phenomenal *method* by which the species or specific prototypes of the various orders of living beings were produced; while the doctrine of evolution, without attempting to explain the origin of life, proceeds scientifically to consider the long intermediate *processes* by which primordial organisms were raised by differentiation and development to the present perfected forms of life.

Common ground and point of divergence of the two opinions.

Fourthly, there seems to be a grave mistake in the nomenclature by which the two views of the origin of nature and of man are distinguished. One is called the Hypothesis of Creation. The other is known as the Hypothesis of Evolution. From this distinction it might well be inferred that those who hold the doctrine of immediate creation reject evolution altogether in the consideration of natural and living phenomena. On the other hand, also, it is plainly inferential from the terms employed that the hypothesis of evolution has been made to exclude the notion of creation. As a matter of fact, neither of these inferences is correctly drawn, if we are to judge by the state of opinion in the present age. The creationists have not excluded, and do not exclude, evolution as *partly* explanatory of the facts and conditions of life. They admit that evolution has performed a certain subordinate and limited office in the production of the living forms now inhabiting the earth; but they lay great stress upon the phenomenal aspects of the beginning.

Grave mistake in the nomenclature of the two hypotheses.

On the other hand, the evolutionists do not exclude creation from the scheme of universal nature. As we have said, they begin the inquiry with the fact of life. The theory runs thus: Given life—that is, the primordial germs of life—and evolution will account for the rest. But this theory clearly does not preclude creation as a part—that is, the primal part—of the scheme of life.

Neither theory is exclusive of the other.

From which, as indicated above, the true division of opinion relates to the mode of operation—the processes and methods by which the present organic forms have come to pass—whether from perfected ancestral pairs for each species, created by a fiat immediately, and, so to speak, full-grown in power and capacity, or whether from potential germs endowed with life, and having in them the possibilities of all the descendent species of living beings which now appear on the earth.

THE TRADITIONAL EDEN.

Still another observation should be made at the outset with respect to the contention of the two opinions or views of the origin of living species. This is that, on the whole, the belief in evo-

lution as explanatory of the *modus operandi* of universal nature has steadily gained ground in the highest opinion of the age. Its first conquest was that of the earth itself. The hypothesis of creation, that is, of immediate and phenomenal creation, formerly included the earth as one of the products of a creative fiat. For a long time the conservative beliefs of the past held their grounds steadily against the encroachments of geology. That science was resisted in its progress by misconception and prejudice as persistently as was the heliocentric theory of our planetary system. Inch by inch the geologist—even as Galileo, his prototype—was obliged to fight his way to a truer concept of the modes and processes by which the crust of the earth has been gradually formed through immeasurable ages of time. Step by step he was obliged to struggle with his demonstration that the fossiliferous history of the globe, as well as the history of the globe itself, extended backwards through eons of time and indescribable vicissitudes of transformation. But the evidence was at length sufficient to convince, and the ancient concept of the earth retreated before the new.

Belief in evolution as a method gains ground among thinkers.

This conquest, however, was only the preliminary swirl of another more important. Zoölogy and botany, taking up the work already accomplished by geology, began to demonstrate that the plants and animals now inhabiting the earth are but the descendants and variant forms of others more simple which preceded them in prehistoric time, and these in their turn but the descendants of the fossiliferous species brought to light in the explorations of geology. Against these discoveries the creative hypothesis opposed itself with great force and tenacity of purpose. The old opinion had been that the existing plants and lower animals are but the living representatives of others *like themselves*, created in perfection and full form only a few thousand years ago—created without an ancestry or previous life of any kind on the earth.

Old opinions contest the field with zoölogy and botany.

To yield this long-accepted opinion seemed as if pulling up the sheet anchor of the whole system of thought which, as a ship, had borne the civilized life of man for centuries. Nevertheless, the evidences in favor of the new theory accumulated. Every excursion into the natural world added its proof in behalf of the belief that the animal and vegetable forms now prevailing over the earth are but the living representatives of more primitive forms preceding them, and they of others back to the geological era, and thence downward through the measureless ages of time required to build up the crust of the globe from the azoïc bed to the present surface.

Investigation confirms new belief as to the lower orders.

At length the evidence prevailed. Again the advocates of immediate and phenomenal creation as applied to the plants and lower animals must recede before the facts and demonstrations of science. The field was yielded with reluctance, and the scattered squadrons of the ancient theory of the method of the beginning of plant-life and animal life are still seen in various parts, holding the ground against the prevalent opinions that have occupied all the heights and vantages of the human understanding.

But the advocates of immediate specific creations did not yield *all* in conceding that plants and the lower animals, such as we now find them in living example on the earth, were the results of

Is man exceptional in the scheme of nature?

an evolutionary process extending backwards indefinitely into the past. Man was still held to be exceptional. To him the hypothesis of phenomenal creation was now applied with redoubled energy. The advocates of the long-accepted belief respecting the mode of the beginning of man-life on the earth, yielding up with reluctance the rest of the field of universal nature, still held with the utmost tenacity to the belief that the human species had had a beginning different in form and manner and circumstance from all the other inhabitants of the earth. Man was set apart and considered in another category of life from all the remaining forms of existence. Here the current view, strongly intrenched in old belief, strongly conservative lest the disturbance of the established opinion might in some way work harm to the existing social and moral order of the world, made its stand, not only for the maintenance of the long-accepted hypothesis, but perhaps for the recovery and reëstablishment of the former systems of belief.

Such was the state of opinion as between the two hypotheses of life history at the middle of the nineteenth century.

Lamarck foreruns the new theory of the mode of life.

Already before this time an occasional thinker had, on a more daring excursion than the rest, suggested the application of the known laws of the natural world, universally, to the human species in common with the other forms of animated existence. Foremost among those may be mentioned Lamarck, who, before the beginning of the century, and more fully in the first quarter of our centennium, set forth in his wonderful speculations, with a cogency and clearness almost unsurpassed, the rudimentary principles of that vast system of thought which now goes by the name of evolution. As must needs happen, however, in the case of a great mind forerunning the camp of progress in strange regions, and not sufficiently acquainted by fact, observation, and experiment with the new realm into which he has entered, Lamarck produced a visionary rather than a substantial scheme of nature; and while the lines which he drew around the unexplored region of the New Biology that was to follow in the hands of another were sufficiently ample, and ran in many parts surprisingly near to the accurate surveying of recent science, he nevertheless included in his excursions and trial maps of nature a vast amount of crude and erroneous deduction for which the more accurate knowledge of the present finds no place.

The work taken up and rectified by recent naturalists.

It remained for a subsequent generation and the more careful mind of another naturalist to reconsider the general aspects of the natural world and to deduce therefrom that hypothesis of evolution which is now accepted by science as explanatory of the *modus operandi* of all living organisms, including man. It is not our purpose in this connection to enter fully into the explication of the principles upon which the evolutionist relies to explain the existence of the various forms of organic life, and in particular the descent of man. It is our purpose rather to point out in an introductory way the leading grounds of divergence between the two opinions respecting the life history of the world, and to show the general trend of opinion and the gain of one theory over the other. It will be desirable, in following the inquiry, to state more fully the substance of the two beliefs respecting the origin of man, embracing in the exposition of each theory some of the particulars of its application to the

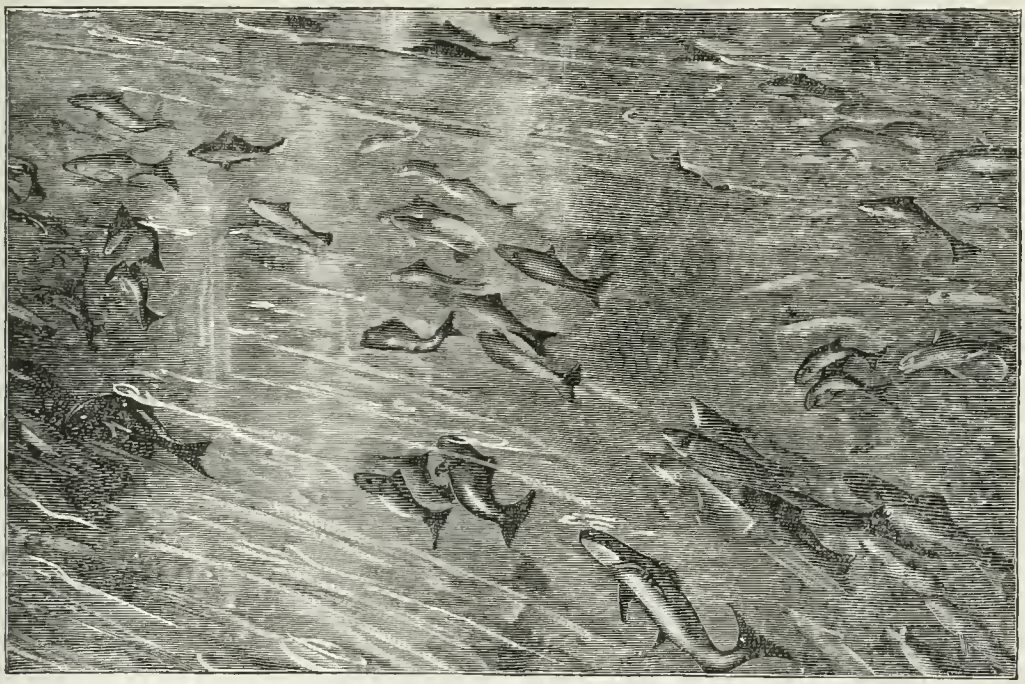
world history and life history of our planet.

The hypothesis of creation is generally understood to signify the production of the world out of naught. Perhaps the beliefs of those who hold the theory of phenomenal creation are not altogether uniform and consistent on this point. In general, however, the belief is that the *matter* of the earth was brought into existence by the fiat of the Almighty. the universe was spoken phenomenally into existence out of nothing, and this view is still maintained by the great majority of those who hold to the hypothesis of immediate creation.

General explication of the hypothesis of creation.

As we have said on a former page, the belief in a creative fiat as the producing agency of the world and its inhabitants, has included as one of its features the notion that our globe was produced *immediately*, and not through intermediate

Literal acceptance and application of the Book of Genesis.



AGE OF FISHES, OR THE "FOURTH DAY."

Some hold that the creative act, as it relates to the earth, was only *formative* —that the matter of our globe existed already in space, and that the act of creation had respect to the production of our sphere and its fitting for the abode and life arena of plants and animals and man. This view is to a certain extent a concession to scientific discovery in recent times. Up to the close of the last century the popular and scholastic belief was that the matter of our world and of stages. The statements contained in the first chapters of Genesis were accepted literally throughout the Christian and Mohammedan nations. According to the account referred to, the space of six days was assigned for the creative work. The account in Genesis is seemingly succinct. Each of the days is occupied with a certain part of creation, and is defined as beginning with the evening and ending with the morning—according to the phraseology of the an-

cient Oriental peoples. By implication this period seems to include the creation of the planetary and sidereal heavens; for "God made two great lights; the greater light to rule the day, and the lesser light to rule the night; he made the stars also."

Order of creation in the "six days" of the first chapter.

The progress of the creative work through the six days of creation is delineated in the first chapter of Genesis. The arrangement is climacteric, and ends on the sixth day with the creation of man, and the words are added, "Thus the heavens and the earth were finished, and all the host of them." It would thus appear that according to the account preserved and transmitted by the Hebrews of the beginning of things the work of producing the material universe, of creating our world in particular, with its inhabitants, including man as the paragon of animals and favorite of the Almighty, occupied but six days of time. The Hebrew word is *yom*, and is the term which is universally employed in that language to express a natural day as measured by a revolution of the earth on its axis.

Meaning of the "yom" enlarged for scientific reasons.

In this sense the account of the creation given in Genesis was universally understood until a comparatively recent date, when the rise of geology and the correlated branches of natural science made the position no longer tenable. At this juncture the upholders of the hypothesis of creation were obliged to take a new position, and that was that the six days, or *yoms*, of the scriptural narrative did not signify six literal days but six indefinite periods of time, corresponding, if rightly understood, to six geological eras, or ages, during which the world had been fashioned for its later inhabitants. Examples were found in Hebrew literature where the word *yom* had been used in a figurative sense, meaning "a period of duration" quite different from a natural day.

There was thus a rationalizing process applied to the account of the creation in Genesis, and its meaning was modified and interpreted anew according to the demands of scientific discovery. It is no longer believed by the advocates of the hypothesis of phenomenal creation that the world and its original inhabitants were created in six literal days—such an opinion being altogether untenable in the light and diffusion of knowledge which the nineteenth century has brought to the understandings of men.

Rationalizing process checked at the borderline of life.

It was still held, however, by the believers in the creative fiat that *the plants and animals* were phenomenally created—that the Almighty by his will and edict brought forth without germ or seed the various species of vegetable and animal life which we see in their descendants at the present time. It was at this point that the real divergence between the two theories began. The hypothesis of creation seems to have yielded material and inanimate nature to the dominion of those known laws under which the world is governed, but to have refused to admit the extension of those laws over the organic forms of which life, whether vegetable or animal, constitutes the essential principle. The theory of creation rejects the notion of a development of the vegetable and animal forms of the natural world from germs remotely planted in the past, and to hold firmly to the immediate production by almighty power of the mature and full-grown originals of the various species of living things.

This is particularly true in the case of man. The doctrine of creation as enter-

tained by the enlightened peoples of Europe and America includes as its leading article the belief in *the immediate and phenomenal production of the ancestor of the human species.* In this particular, also, the opinion which has long prevailed with regard to the progenitor of mankind has been based immediately on the narrative of creation as given in the first two chapters of the Book of Genesis. The account, or rather the accounts, there given of the formation of the first pair of human beings are world-wide in their dissemination, and have found a profound lodgment in the convictions of all those peoples whose religious institutions are based upon the sacred writings of the Hebrews.

Creation hypothesis demands an ancestor.

The two forms of narrative in Genesis are, first, that the Almighty in the sixth day or epoch of creation designed the production of a being superior to the other orders of animate nature; that the being thus purposed as the climax of organic life was to have "dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth." So the Elohim created man in his own image, in the image of the Elohim created he him; male and female created he them. In the second chapter the variant form of the narrative is given. There is a reference to the atmospheric and meteorological condition of the world. For as yet there had been no rain, nor was man found to till the ground. But there went up a mist from the earth and watered it. Then the Lord Elohim formed man of the dust of the ground, and breathed into his nostrils the breath of life, and he became a living soul. This first man was placed in the garden of Eden, said to have been "planted eastward." But the man was alone, and the Lord Elohim caused a deep sleep to fall upon the Adam—for such was the name given him—and he took one of his ribs and made thereof a woman, that is Ishah, or *female man*, and brought her to Ish, the man, as his companion. The name of the Adam which was given to the man signified Earth, or Red Earth, and to the woman the Lord Elohim gave the name of Life—for she was the mother of all living.

Summary of the two narratives in the Book of Genesis.

Such according to the common understanding of the narrative in Genesis was the origin of the first pair of human beings, and from them the races of mankind have descended. Further on in the Book of Genesis we have sketches and outlines of the immediate and more remote offspring of the parents of the race. In the tenth chapter there is an account of tribal and ethnic dispersions sufficiently ample to explain the presence of the primitive peoples in the westernmost parts of Asia, Southeastern Africa, and Eastern Europe. With this summary, however, the subject of ethnography is dropped from the Scriptures, though certain important lines of descent were recorded until long after the destruction of the Israelitish nation.

Outlines of a biblical ethnography.

The account of the origin of things given in the first chapter of Genesis is a part of a lore which was common to all the Semitic peoples of antiquity. All of these held traditions in which the critical reader is able to discover at least the outlines of a common belief with regard to the *modus operandi* of creation. One of the particulars which always reäppears in these accounts of the beginning is that flood, or great deep, or primeval chaos upon which the wind or breath of

Account of creation in Genesis common to all the Semites.

THE EDEN OF POETRY.—Milton's Vision of the First Pair and Raphael.—Drawn by Gustave Doré.

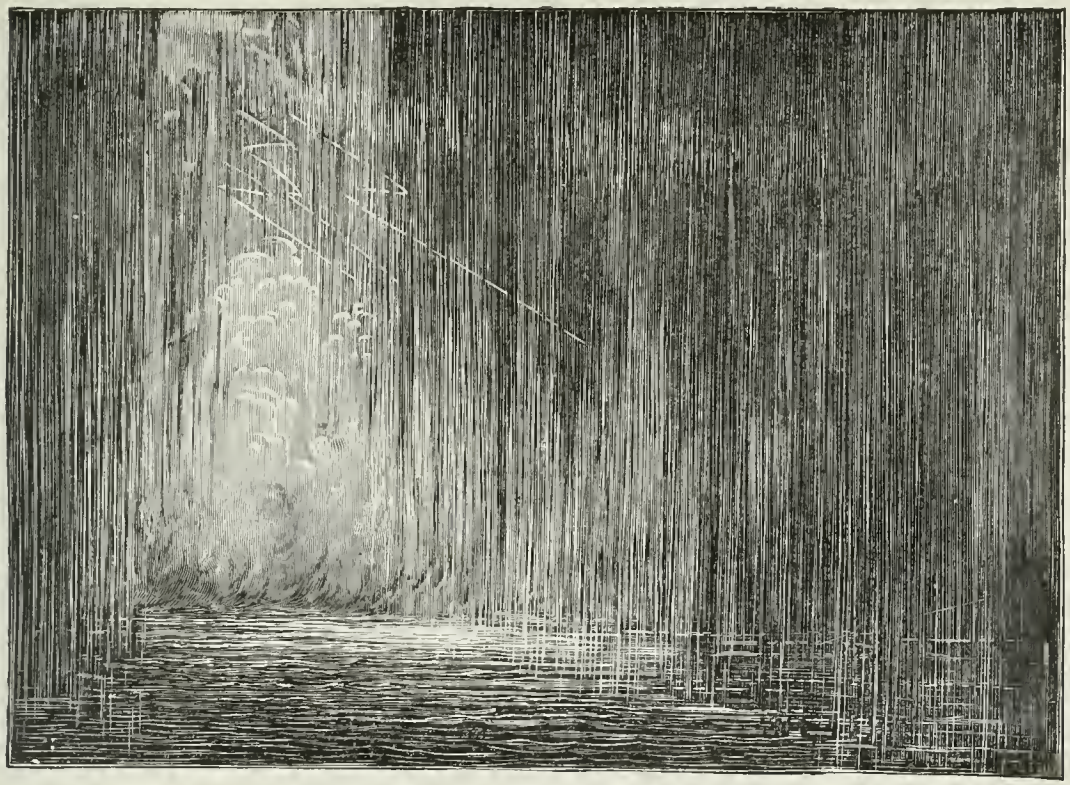
the Elohim is said to have blown as the first movement of order.[1]

This notion is strongly imbedded in the cosmogony of the Chaldees, though with them the primeval flood is spoken of as *feminine*, instead of the masculine form used in Genesis. The universal chaos is, in the oldest Babylonian accounts, regarded as containing the creative beings or forces by whose agency the world was to become organic and man be produced. From this concept there was a departure in the Hebrew narrative. In the latter the Demiurge is not represented as coming up out of the primeval flood, but as apart therefrom, and brooding over it, and sending thereon the primal winds of order.

Variations in the Chaldee story of the beginning.

In other respects the ancient Semitic accounts of the creation preserved in the fragments of Berosus, and better still in those inscriptions and tablets which the learned George Smith has interpreted to the understanding of our age, correspond with the majestic imagery outlined in the Book of Genesis. There is the same general arrangement of the materials of nature and the same agents of order and intelligence; the same introduction of a Demiurge, or Creator, speaking a fiat; the same eulogy pronounced after each creative effort upon the thing created as "good" or "beautiful" or "delightful;" the same subordination of the stars and greater luminaries as determining days and seasons.

General agreement in the two visions of creation.



ONE OF THE PRIMORDIAL CONDITIONS OF THE GLOBE.

[1] The language of Genesis seems in the original to bear this sense: "Now the earth was involved in chaos, and darkness was upon the face of *tehōm* (that is, the flood), and the wind of the Elohim was hovering upon the face of the waters. Then the Elohim said, Let light be. And light was."

In one respect, however, there is, or has been believed to be, a striking difference between the narrative in Genesis and the ancient forms of the creative story as the same are preserved in the ruins of the Babylonian plain on the tablet cylinders of Asshur-Bani-Pal's library chamber, and in the fragmentary remnants of Berosus. This is the polytheism of the creative work in all the Babylonian accounts of the beginning of things, and the monotheism of the ancient Hebrew narrative. Even in this respect there is a hint of the original common derivation of all the accounts in the word *Elohim* used by the primitive Hebrew seer in expressing his vision of creation. This word is plural, though it is believed by critics to be an instance of what is known in the Hebrew idiom as the "plural of majesty or strength." Literally, the polytheistic idea is carried forward into Genesis, where it is said that the Elohim (literally, the El-gods) created the heavens and the earth and all the host of them.

Monotheistic divergence of the Hebrew narrative.

In still another particular a divergence may be noticed in the earliest Semitic accounts of the creative work. In the Hebrew narrative the Demiurge, or Creator, works *upon* matter. It seems to be plastic under his hands. Aye, more than this, according to a long-accepted construction of the account in Genesis, he *makes* the matter out of which he makes the form. His work is not only formative, and as it were plastic and constructive, but creative, in the prime intent, of something out of naught. In the Chaldee traditions and kindred forms of Semitic lore the creation, on the other hand, is rather evolutionary. The creatures by whom the later work is done are themselves evolved out of the chaotic floods. There is no hint of the production of matter out of nothing, but only a secondary process of demiurgic workmanship and power upon the materials of nature.

Hebrew Demiurge works upon matter and creates it.

On the whole, it is sufficient to note the substantial identity of the cosmogonies of all the Semitic peoples and the transmission of the outlines of the same in the sacred writings of the Hebrews to the nations of modern times. Among other ancient peoples the Egyptian system may be mentioned as an example of one of the oldest forms of belief in phenomenal creation. In that system the Demiurge is named Thoth. He it was who gave light to the world when all was darkness, "and there was no sun." To this extent there is a suggestion of the same primeval chaos believed in by the Semitic seers. In Egypt, also, the work is polytheistic. While to Thoth was assigned the creation of light, Ra was regarded as the supreme Demiurge of nature. He was at once the sun god and the Anima Mundi. The more immediate evolution of living forms was assigned to Ptah, who was the "opener of the egg of the world." From this origin the species of living forms may be said to have proceeded. But the system is vast and intricate, and calls for no additional comment in this connection.

Egyptian tradition of the beginning of things.

Scholars have busied themselves much with the work of attempting to discover among the mythologies of the Aryan nations the outlines of a system of creation similar to that of the Hebrews and the Semites in general. But the effort has been attended with little success. The Aryan peoples have from a very early age looked upon nature and creation with another eye. In a single instance a likeness has been discovered between

Creative hypothesis of the ancient Iranians.

the belief of a primitive Aryan people and that of the Semitic races. This is in the case of the ancient Iranic family whose religious faith and theory of the origin of things are recorded in the Avesta. In that work the creation of the visible world is ascribed to a supernatural deity who issues a fiat, and nature begins to be. There is a similar godspeech at the beginning of each creative act, and a like eulogy at the close on the perfection of the world. A striking point of dissimilarity—in which the Avesta myth agrees with the accounts preserved by the Chaldees and the Assyrians rather than with the narrative of Genesis—is that in the latter the world is spoken from naught, while the Zend represents it as being formed from preëxisting matter. Ahura-Mazdâo speaks and creates; but he employs the matter of a universe already existing. Also he avails himself at times of the aid of other spirits, both good and evil. At times the traditions of Ahura-Mazdâo rises in majesty almost to the level of the Elohim of the Hebrew seer. In the celebrated cuneiform inscription at Naksh-I-Rustam he is described as "the great God of gods who made heaven and earth, and made men."

If we follow the line of the Aryan evolution, however, we shall find the development to present a universal polytheism. In Indian and Grecian mythology there are as many gods as tribes, with only an occasional glimpse at a supreme deity. There was, moreover, little trace therein of an original universal creation. The Hellenic system followed the present aspects of nature back to a multiplicity of secondary causes and agents, but never fixed the beginning of things on any substantial basis. Matter was always presupposed. In the old Indian system there are glimpses of a higher and seemingly monotheistic belief. In one of the greatest of the Vedic hymns we have the following: "In the beginning there arose the Golden Child. He was the one-born Lord of all that is. He established the earth and the sky. Who is the God to whom we shall offer our sacrifice? . . . He who by his might looked even over the water clouds, the clouds which gave strength and lit the sacrifice; he who alone is God above all gods. Who is the God to whom we shall offer our sacrifice?

"May he not destroy us—he the creator of the earth; or he the righteous who created the heaven; he also created the bright and mighty waters. Who is the God to whom we shall offer our sacrifice?" In this last strophe we have the ascription of creation to Indra, and the earth and the heavens and the waters are mentioned as the workmanship of his hands. There is no suggestion, however, of a creation out of naught. On the contrary, among all the Aryan mythologies there is the presupposition of material nature. It is as though the earliest bards and philosophers of these great peoples should have adopted one of the fundamental theorems of modern materialism, namely, there are two eternal things—matter and force. But in all the attempted explanations of the natural world there was a recognition of creative intelligences employed in forming and shaping and begetting the world and its inhabitants.

Polytheistic character of the Aryan myths of creation.

Old Vedic hymn assigns the creation to Indra.

On the whole, the principal distinction between the views entertained of the beginning by the Semitic seers on the one hand, and the Aryan poets and philosophers on the other, was that the latter accepted to a larger degree the ex-

Aryan seers more evolutionary than the Semitic.

istence of evolutionary processes in the origin of the world and all living creatures, while the former, the Hebrews in particular, laid great stress upon the creative fiat of an Almighty Power, speaking the world out of nothing and acting by his breath and will upon the flood-like chaos of primeval nature.

This outline of the manner of the beginning of things by immediate and phenomenal creation—entertained as it was by the nations of antiquity—need not be amplified, as it is familiar wherever the civil and religious institutions of the Western nations have prevailed. Up to the middle of the present century the belief in a fiat of the Almighty as the sufficient cause and explanation of all created things was wellnigh universal. This implied the production of all living beings, by their respective species, at one stroke of a supreme will exercised upon matter, and answered by the springing up of immediate and perfected creatures, each in its kind.

Long-continued prevalence of belief in creation by fiat.

With the development of the natural sciences, however—with the better understanding of the genesis of the earth as revealed in geological history—many doubts arose as to the correctness of the popular and dogmatic concepts respecting the origin of man and the associated orders of life. More and more it came to be accepted as true that nature has been uniform in her methods of production and development, and that scientific evidences are wanting of any break or sudden reversal in the progressive methods of life unmistakably recorded in the fossiliferous and subsequent history of organic forms.

Science discovers the uniformity of natural processes.

We have already seen to what extent Lamarck forecast in his speculations the impending struggle of the new scientific concept of life history with the long-accepted belief in a phenomenal origin of species. That philosopher formed and promulgated a theory of nature involving in many of its elements the system of evolution which a half-century later was to appear with more distinctness in the writings of another and greater naturalist. The leading doctrines of the Lamarckian system are embraced in four theorems by which the author would explain the production of organic forms and the differentiation of living species. These are as follows:

The Lamarckian philosophy; the four theorems of life order.

1. "Life by its proper forces tends continually to increase the volume of every body possessing it, and to enlarge its parts up to a limit which it brings about.

2. "The production of a new organ in an animal body results from the supervention of a new want continuing to make itself felt, and a new movement which this want gives birth to and encourages.

3. "The development of organs and their force of action are constantly in ratio to the employment of these organs.

4. "All which has been acquired, cast off, or changed in the organization of individuals in the course of their life is conserved by generation and transmitted to the new individuals which proceed from those which have undergone those changes."

Concerning these propositions of the French naturalist we may remark of the first that it clearly *presupposes life*, and therefore suggests no more than the method or manner by which the development and completeness of organic bodies are attained. The theorem does not touch the question of the genesis of

What the system does and does not contain.

life, but only the *modus operandi* of living organisms. As to the second law, it departs widely from the doctrine of evolution as subsequently propounded; but the principle expressed therein is nevertheless recognized as an existing and efficient force in the production of the organs with which living bodies are supplied. The third law is doubtless correct in the main as expressing the ratio between the use and the development of the organic parts in all living structures. The fourth law is simply an expression of the well-known principle of heredity, which undoubtedly plays so large a part in determining the character and limitations of species.

On the whole, though Lamarck—following as he did the hints and suggestions of Buffon—made a bold excursion into what was, at his time, a comparatively unexplored field of inquiry, and suggested much which was calculated to arouse the understandings of men to the difficulties and inconsistencies involved in the accepted belief respecting the origin of species, and, indeed, the whole method of the natural world, he nevertheless missed by much the clearer principles of that system of doctrine which was destined, under the name of evolution, to contest so strongly the ground long occupied by the hypothesis of phenomenal creation as the only solution of the beginning of universal nature and of man. It remained for the first part of the after half of the nineteenth century to witness the rise and development, first in the higher circles of science, and afterwards more broadly among the peoples of the Western nations, of the belief that the varied and perfected forms of living organism have resulted from a process of differentiation and development from a few simpler primary forms by the agency of natural selection and the survival of that which was best adapted to the conditions of its environment. The progress of this opinion and its actual conquest of several antecedent beliefs respecting the *modus operandi* of life has itself been an evolution in the history of human thought, and may well require some extended notice of the various stages through which it has passed.

Lamarck missed the recent theory of life in many essentials.

The term evolution first appears in the biological essays of the eighteenth century; but the idea is as old as Aristotle himself. It might almost be said to have been in all time the covert or half-expressed opinion of leading naturalists in different ages and countries. The great physiologist Harvey (1578–1657), who shares with Servetus the honor of having discovered the circulation of the blood, was a believer in the theory of *epigenesis*, namely, that the new organs of the higher animals do not appear suddenly by the simultaneous addition of parts, or by a sudden change in the arrangement of tissue, but by the successive differentiation of a single rudiment into the several organs of the body by the influence of *use* and *the adaptation to environment*. Near the close of the seventeenth century the question was reviewed by Marcello Malpighi, of Bologna, who by the application of the microscope to the study of tissue in embryo came to conclusions quite different from those of his predecessors. His views respecting the process of production in living bodies are known as *metamorphosis*, in contradistinction from epigenesis. The new opinion was taken up and carried forward by Leibnitz and Malebranche, and by Bonnet and Haller, who amplified and applied the speculations of their predecessors to large groups of

Historical development of the evolution hypothesis.

vital phenomena. After them came Buffon, the elder Darwin, and Lamarck, to the last-named of whom, as we have seen above, the origination of much of the hypothesis of evolution as it is now understood must be referred.

Up to the middle of the present century, however, the views of biologists were rudimentary and tentative. It remained for Charles Robert Darwin to gather up the opinions of his predecessors, to eliminate therefrom by observation and critical methods those parts which did not consist with the order of nature, and to formulate on the basis of fact and right reason that remarkable theory of the origin of species which has to so great an extent fixed itself in the convictions of mankind as the true explanation of the manner by which the germinal forms of life have been evolved, by struggle, adaptation, survival and natural selection, into the multifarious varieties of living forms which inhabit the earth. With him and his work is intimately associated the great naturalist, Alfred Russel Wallace, who, by a complete coïncidence, on July 1, 1858, transmitted by the hands of Sir Charles Lyell, and, without knowledge of the investigations of Mr. Darwin, gave to the Linnæan Society his paper "On the Tendency of Varieties to Depart Indefinitely from the Original Type." It was on the very same date that Darwin himself read before the society his paper "On the Tendency of Species to Form Varieties, and on the Perpetuation of Species and Varieties by Means of Natural Selection"—a production which was the basis and fundamental form of the greater publication made by the author in the following year.

CHARLES ROBERT DARWIN.
From the medal by Alphonse Legros, Royal Academy, 1882.

Darwin and Wallace lead the revolution in biology.

Since the close of the sixth decade of the current century a vast controversial and expository literature has been produced, having for its bottom principle of

contention the hypothesis of evolution. To this literature the leading naturalists and thinkers of all the civilized nations of the West have contributed. The new doctrine has made its way from the speculative reveries of men and from the hitherto unconsidered facts of nature into books and libraries and seats of learning, and from these it has descended by percolation into the common mind until, at the present time, some knowledge of the leading principles of evolution is possessed by nearly all intelligent people. The hypothesis is most clearly stated in Darwin's *Descent of Man*, published in 1871—a work supplementary to the *Origin of Species*. Biologists have in general adopted the doctrine as the beginning of all their teaching, and it is but just to say that the more it is applied to the phenomena of life, the more complete and reasonable does it appear as an explanation of the process by which all living beings have arrived at their present state of development.

Controversial literature and tendency of contest.

CHAPTER XI.—GENESIS OF THE NEW DOCTRINE.

IN order to a clearer understanding of the Doctrine of Evolution, it is necessary to note with precision several things which it does *not* teach. Close attention to these particulars may serve to show how grossly a new opinion—making its way among the old beliefs of mankind—is likely to be misunderstood, misapplied, and misrepresented by the advocates of opposing views. Perhaps no other hypothesis which has ever been propounded as the explanation of a large group of phenomena has suffered more in this respect than the doctrine of evolution. It seems at the very first to have been looked upon as a malevolent opinion, calculated—and indeed designed—to disturb the existing intellectual and moral order of the world.

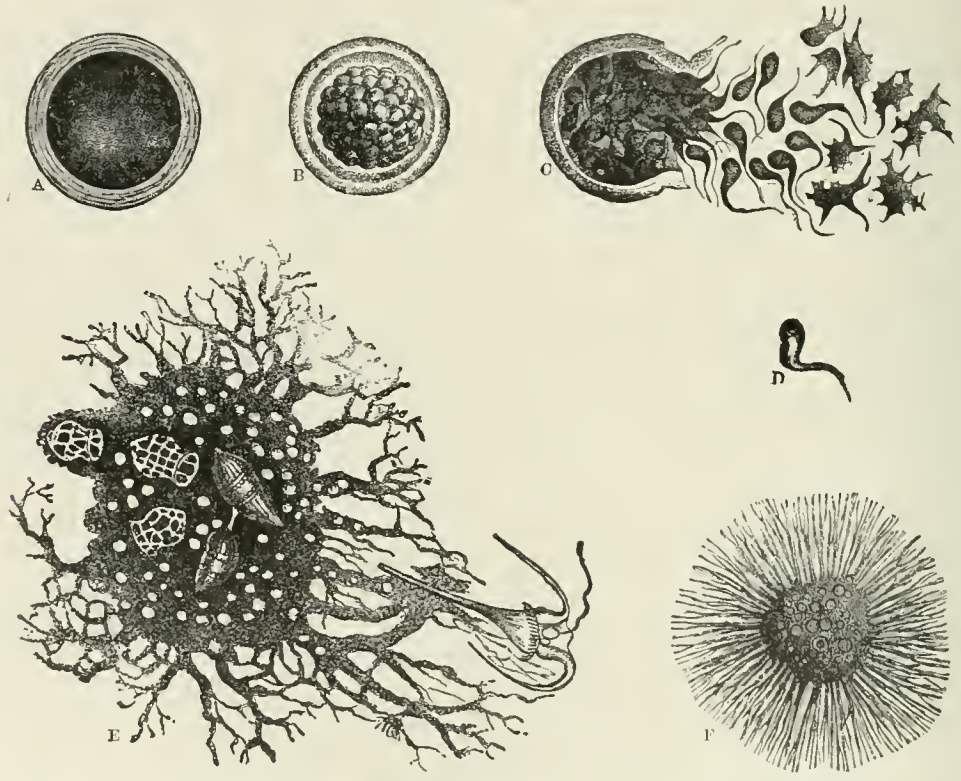
It is an unfortunate fact in the history of the human mind that it takes up arms and assails with unseemly animosity whatever opposes itself to its preconceptions and long-established modes of action. Evolution did to a certain extent, though propounded in one of the mildest and most conciliatory books of the century, disturb the existing beliefs of the world with respect to the phenomenal creation of species; but otherwise it can hardly be said that the new doctrine obtruded itself with violence upon the former concepts of men respecting themselves, their nature, or their destiny. Indeed, it has been no part of the evolution hypothesis to discuss teleological questions, or to travel in any direction beyond the region of fact and scientific deduction. The whole significance of the doctrine is its application to the visible *processes* of the natural world, with special reference to the tendencies and movements of organic life, by which the higher and more complex are derived from the simpler and more rudimentary forms of existence.

The mind takes arms when old opinions are assailed.

The first and greatest of the misconceptions which have popularly prevailed respecting the doctrine of evolution is that it has presumed to teach the origin of life. A belief has been disseminated

Evolution deals not with final causes or the origin of life.

that the new hypothesis proposes to account for the existence of life on our planet—to do so by the operation of the known laws of the natural world, and thus to refer all life to a purely material origin. This view of the doctrine is at once untrue and gratuitous. Perhaps a few biologists in their speculations have suggested the possibility of a purely material beginning for the vital phe-



ORANGE-COLORED MONERON.—SHOWING THE SEEMINGLY AUTOMATIC PROCESSES OF GERM LIFE.

nomena of the world.[1] Some have spoken of the physical basis of life in a manner to suggest the indissoluble union and interdependence of mind and matter; but the theory of evolution has not, as a theory, concerned itself with such inquiries. It has naught to do with teleology, but rather with the processes and modes of life. It considers life as a fact already existent in the world, and proposes no more than a rational explanation of the processes of differentiation and growth. It traces the correlations of life and organization, but does not presume to account for the beginning of the one or the ultimate purpose of the other. In a word, the notion of final causes does not enter into the doctrine of evolution, and is indeed foreign to the legitimate field of investigation which is the peculiar province of the new science of living forms.

It is doubtless true that the misconception here referred to has been the

[1] The foundation for such a view of the origin of organic forms is so slight as to be neglected. In a few instances vital phenomena have been observed in which it would seem that life begins in merely physical reactions; but the investigation of such facts is doubtless incomplete. In the case of the so-called orange-colored moneron we have an example of the alleged automatic or spontaneous processes of life (marked in the drawing A, B, C, D, E, F,), but it will no doubt be found that in this as in all other organic tendencies the *beginning* of life is—life.

fruitful source of the greater part of the animosity which the scholastic and ecclesiastical worlds have shown to the evolution hypothesis. The thought of mankind in the past ages has been greatly occupied with the notion of final causation. A great first cause has been demanded by the mind as the ultimate producing force and explanation of whatever is. This notion has included the creation of matter out of naught, but more particularly the creation of the specific prototypes of all the existing forms of life. The doctrine of evolution seemed at first glance to destroy the idea of a final cause as the efficient source of all things, and to substitute therefor the notion of one thing, namely, matter, with its potencies and laws.

Results of the misconception of the theory.

There was thus a failure to perceive that the true doctrine of evolution, as it was propounded and illustrated by Darwin, Wallace, and their followers, did not include—as it does not now include—the consideration of final causes. On the contrary, the author of the doctrine succinctly and carefully disclaimed for the hypothesis of evolution any purpose of accounting for the origin of life or for the ultimate plan and purpose of organic being. He would from the first carefully limit the inquiry to the modes and processes by which the organic forms of life are evolved from their respective germs; but life itself as a principle and fact in material nature is always presupposed and granted.

Originators of the hypothesis declare its true intent.

A proper attention to this important feature of the doctrine of development must have gone far, had it been duly weighed, to abate, if not wholly remove, the deep-seated antagonism between the ancient theorem of life and the doctrine of evolution. It must be understood, then, at the outset that this doctrine, instead of removing the notion of a final cause, instead of accounting for the origin of life, actually presupposes the existence of life and contents itself with an inquiry into the laws and processes by which living organisms are brought to their perfected development. The ultimate cause of vital phenomena remains as occult and inaccessible since the beginning of the prevalent theory of evolution as it was before.

Antagonism has followed misconception of the doctrine.

The recent recognition of the fact that the doctrine of evolution does not preclude a final cause as the explanation and source of life has gone far toward a reconciliation of the two opinions which for a quarter of a century or more warred with each other for ascendency over the beliefs of mankind. While from one point of view the evolutionists, by their ever-extending conquest, may claim the victory over the long-prevalent doctrine, from another station it is possible for the creationists, reconstructing their views out of scientific materials and by the tactics of right reason, to reassert their sway in this, that science does not account, can not account, for the origin of life, and is obliged to accept from the creative hypothesis its essential principle and doctrine, namely, that the germs of life from which all organic forms have proceeded to maturity by growth and law were not themselves the products of matter or of the material forces now operating in the natural world.

Reconciliation of theories follows understanding them.

A second popular and widely prevalent error which has done much to prejudice the doctrine of evolution, and to postpone its acceptance by the civilized peoples of the world, has been the belief

Mistaken belief that evolution teaches cross-descent of species.

that this doctrine teaches the descent of the higher animals, including man, from the lower animals; that is, from lower animals *different in kind*. For a long time after the hypothesis of evolution was formally given to the world by Darwin and Wallace, it was believed that the new doctrine included as its leading feature a belief that man is a descendant of the apes or monkeys. Human nature in its present refinement was scandalized with such a proposition, and without pausing to consider whether such a notion was really a part of the evolution hypothesis, rejected it with disdain. This is the more surprising when we remember that Darwin and all the great promoters of the new doctrine had carefully disclaimed the deduction of a cross-descent of man from existing species of animals. There was a failure in public opinion, and even on the part of scholars, to discriminate the true from the false intent in the proposed explanation of the origin of species. The belief became deeply fixed that evolution signified a degraded and bestial ancestry of the human race from those creatures for which, by acquaintance with their habits and characteristics, civilized people have conceived so deep a repugnance.

The theory of evolution, however, is not justly chargeable, as we shall hereafter see, with the crude, widely disseminated notion that the human species has been derived by descent from the anthropoid apes. True, the doctrine is that mankind are the lineal offspring of lower forms of life, not perhaps more highly developed than the simians of existing species, and these in their turn of others still lower in the scale of existence. But the idea of cross-descent which would make any one species of the higher animals to have been derived from some other existing species of a different kind is not only foreign to the theory of evolution as set forth by its great advocates, but is positively contradictory of the leading principles of the doctrine.

The distinction here drawn between that cross-descent which evolution has been untruly charged with teaching, and the lineal derivation of every existing species from its *own* ancestral line backwards through the various grades of organic development from the simpler forms of a remote ancestry, or even from the remotest germ of life, is fundamental to any correct apprehension of the theory. The law of the specialization of living beings by departure from common types, instead of favoring the notion that one species of living organisms is deducible from another existing species, between which and itself a wide chasm has already been opened by the process of differentiation, positively forbids such cross-descent, and makes it impossible. It has long been known, indeed, that nature herself has put a bar, in the infertility of hybrids, against the amalgamation, cross-grafting, and confusion of the orders of life such as would be implied in the possible derivation of one species from another different in kind.

Distinction here drawn fundamental to the question.

The principle here insisted on as fundamental to a correct understanding of the doctrine of evolution is world-wide in its manifestations. Upon this principle, as an example, the modern science of language is based. Without it we should possess at the present time no really scientific knowledge of human speech. All linguistic phenomena conform to laws precisely analogous to those which govern the evolution of living organisms. This indeed is no more than might be expected; for language is so

Analogy of linguistic phenomena to living species.

distinctly correlated with the nervous and cerebral development of the highest and most perfect of the animals as to constitute an invariable index of the stages and modes of life through which that animal has passed.

If we take the most cursory survey of the science of language and of the history of that science since it began to be, we shall find a series of mistakes and misconceptions respecting it almost identical with those which have beset and perplexed the doctrine of evolution. Glancing for a moment at the six or seven principal families of Aryan speech, we find two of the divisions in Asia and the remainder in Europe. The former are the Indic and Iranic families, and the latter the Græco-Italic, the Celtic, the Teutonic, and Slavonic branches. Aforetime it was believed and taught that Latin was a derivative of Greek. Subsequently, within the current century it was concluded that both Greek and Latin were derivatives of Sanskrit, and it was sometimes in dispute whether Celtic was derived from a Græco-Latin original or the latter from it.

Languages not the result of cross-derivation.

The whole idea of the species of language—if we may so name the different varieties of speech—was thus confused and blurred by a total misapprehension of the fundamental principle of linguistic descent. Even scholars seem to have had no notion of the origin of a given tongue except that it had been derived from some other given tongue. In a word, it did not occur to the early philologists that there might have been, and indeed was, out of the nature of the case, a prehistoric primitive language out of which, as from a common germ, all forms of Aryan speech had descended.

Mistake of philologists as to laws of language descent.

At length, however, the true concept arose upon the understandings of scholars, and with it came the beginning of a true science of language. Henceforth the absurdity of supposing Latin or Celtic to have been derived from Greek, or Greek from Sanskrit, was manifest, and at the present time even the novice in linguistic study is too correct in his apprehension of the problem to admit the preposterous notion of the cross-descent of one language from another. What should be said of the attempt to derive French from Italian, Wallachian from Portuguese, Rhœtian from Spanish, Swedish from Dutch, Icelandic from Anglo-Saxon, English from German? The scholar knows that the six Romance languages have been produced by linguistic evolution and vicissitude out of an original Latin—produced by a process of natural selection and survival of the fittest. He also knows that Latin and Greek and Teutonic and Iranic and Indic speech are all the descendants of an ancient original which, though it exist only by hypothesis, is known as certainly to have existed as are the species of extinct animals whose fossil remains are preserved within the stony covers of the book of geology. The idea of cross-derivation among the languages has thus been eliminated by scientific investigation; and the derivation of one tongue from another by cross-descent is no more spoken of as a thing possible among the phenomena of human speech.

True concept of relation of languages to their originals.

It is in this manner, or in a manner precisely analogous, that public opinion, and even the incorrect teachings of scholars, have had to be corrected respecting the hypothesis of evolution. It is surprising to open the earlier series of the many hundreds of controversial volumes produced in Europe and America

Erroneous opinions of scholars corrected in our day.

on the subject of evolution, and to find them pervaded in every part with the two gross misapprehensions to which we have referred; namely, first, that the doctrine presumes to explain the *origin* of life by the operation of existing physical laws; and secondly, and more particularly, that it teaches the descent of man from the apes and monkeys.

It may suffice in this connection to brush away once for all these erroneous views and misconceptions respecting the sense of the evolution hypothesis. That hypothesis does not presume, and has not presumed, to explain the origin of life, but beginning with the fact of life, it has aimed to explain the processes, laws, and modes by which the many varieties of organic being have been brought, by natural selection and adaptation to environment, up to their present perfected forms. And in the second place, the doctrine of evolution has not taught, but has on the other hand distinctly denied, the cross-descent of man from the higher primates, or of these from lower existing orders of animated nature different in kind.

Evolution seeks to explain the processes of organic life.

After removing from the mind of the reader the foregoing misconceptions with regard to the theory of evolution, we might at once proceed to explain and elucidate affirmatively what that theory really is; but before doing so we may well pause to note historically the circumstances which preceded the announcement of the new doctrine of organic life. As has been said above, the hypothesis of evolution is itself an evolution out of antecedent conditions long operative in the minds of men, bringing them gradually to the formation of a new concept of universal nature, of our earth in particular, and of its inhabitants.

Circumstances preceding announcement of the new theory.

The great promoters of the new theory of the *modus operandi* of life were themselves prepared for their office and work by forces which were actively at work before their birth. In short, under the operation of those general laws by which the intellectual as well as the material life of man is conditioned, the time had arrived when the old anthropomorphic concept of nature was destined to be displaced by another and more rational explanation of the existing aspects of organic life, and in particular of the methods by which the specific germs of all things living had been developed into their present forms and powers. It can but prove of interest to sketch the intellectual preparation which preceded the announcement of the hypothesis of evolution.

Teachers of evolution themselves an evolution.

In the first place, Descartes had formed and promulgated the conception that the material universe is divided into living and non-living matter, and that it has the nature of a mechanism. From these postulates he held that the universe is susceptible of interpretation in accordance with physical laws. In the second place, the age of observation and experiment had supervened in place of the age of dogmatism and authority. The introduction of the microscope and the profounder researches of chemistry had led to a knowledge of tissue and of structural forms which had never before been attained. Consequent upon these new excursions of science, the discovery was made that structure has a history reaching from a simple origin in germ life to the vast complexity of organic life. This history was found to be repeated in every form of vegetable and animal existence, thus furnishing the hints of larger laws than had ever been known hitherto.

Descartes is followed by an age of observation and experiment.

With the progress of observation, analogies were discovered between the individuals constituting varieties and species and between the species of correlated groups constituting the suborders and orders of creation; in every part there was the hint of law. The next stage in the coming scientific concept of nature was the observation that all species, even they of habits widely different, have a common fundamental structure or plan of organization, with only such departures therefrom as the particular environment and habit of the animal or plant may have suggested. This was followed with the discovery of certain parts in the structure of living beings for which the animal possessing them had, under its changed conditions and habits, cast off or lost the use, and which had shrunk from disuse into a rudimentary form merely suggestive of the lost functions—thus indicating the course of life which the given animal had pursued in its development. Still further, the observation was made and recorded that all living beings are subject to variation under changed conditions of environment and habit.

Discovery of analogies between individuals and species.

Finally, while these various branches of investigation were in progress, geology completed its work by classifying and arranging the extinct forms found in the crust of the earth, so that their succession from the lower to the higher orders was scientifically determined—thus establishing the fact that the prehistoric history of life in our planet was a history of progress, metamorphosis under changing conditions, and evolution. All of these forms and principles of knowledge, none of which antedate the seventeenth century, were modified and extended slowly and irregularly during the eighteenth, but were not brought to a condition from which generalizations relative to the universal laws of life might be formed until about the middle of the current centennium. It does not require prescience, or even the greatest acumen to discover in the conditions here present—in the stage of discovery and observation respecting vital phenomena—the probability and necessity of the promulgation of a new concept of universal nature and of man.

Geology determines the order of extinct species.

Still another fact which strongly prevailed to substitute for anthropomorphism the new doctrine of evolution under law was the enlarged and corrected knowledge which had been gained in recent times of the life of the individual. It is here, indeed, that the theory of evolution really begins. The hint of the general law is furnished by the individual organism, by the method of its beginning, by the process of its development, and the conditions under which it reaches maturity and perfection. We have only to study with particularity the progress of the individual in order to gain an epitomized knowledge of the history of the species or variety of which the individual is the constituent unit.

A knowledge of evolution begins with the individual.

The ignorance of antiquity with respect to anatomical and physiological laws and phenomena, is a fact that may well surprise the understanding. When we consider, for instance, that the human body is to the faculties of the mind and to the consciousness the most immediate and tangible of all the facts of nature, we may well be surprised at the profound ignorance of even the greatest minds of antiquity with regard thereto. The scholars, statesmen, warriors, and poets of the Græco-Italic races, as well

Ignorance of antiquity respecting physiological laws.

as the old bards who sang the Vedas, the priests who formulated the cult of Osiris and Isis, the Chaldee sages who studied by night the planets and stars, and the venerable seers of Israel, were all alike ignorant of the simplest processes of organic life. The functions of bodily organs were unknown, or at least not understood. The body throughout was a mystery. Its structure had never been investigated. The relations and offices of its parts were totally misapprehended. The beginning of life was misconceived in its nature; and though the body seemed ever to invite to anatomical and physiological study, the notions of even the wisest on these subjects were crude in all particulars and preposterous in most.

Indifference of the ancients to the processes of organic life.

It were hard to account for what seems to have been the indifference of the great thinkers of the ancient world to the practical questions of organic life. It would seem that the mere accidents to which living beings have been subject in all time would have taught the scholars of the classical ages much more than they ever knew about the anatomy and physiology of living bodies. It is an amazing fact that all the learning of antiquity failed to note so simple a thing as the digestion of food or the circulation of the blood. The offices of the organs were as little known as though the body did not contain a brain, a heart, a spinal cord, an alimentary canal. Nor did this ignorance give place to light under the scholasticism of the Middle Ages. On the contrary, in the mediæval times superstition raised its hand against all that kind of investigation which now goes under the name of natural science, and the absurd beliefs of antiquity respecting the methods and phenomena of life were intensified by the general gloom which overhung the human mind.

Knowledge proceeds from the individual to the species.

It is to the present century that the great scientific discoveries must be referred by which the *modus operandi* of organic being has been revealed. We here speak of life in the individual, and refer thereto in order to show the tremendous influence which a knowledge of the laws of individual growth has exerted in the larger theory which explains varieties and species and orders and, indeed, universal nature, by the same principle which brings a single organic being from the germ to its perfected form. What, then, is the outline of evolution as deduced from the individual organism?

All organic life proceeds from germ cells having life.

Each living thing has been evolved from a minute particle of matter in which the most critical tests of science are unable to discover the slightest resemblance, outline, or suggestion of the adult form which is to arise therefrom. This living particle, from which the complex organism is to proceed, is called a germ. It is simply, in its primordial state, a cell of living matter, endowed potentially with a principle of growth, expansion, and final maturity of organic structure; but no trace of such organic structure is discoverable in the germ itself. Indeed, it is not certainly known that a germ is actually alive. Perhaps it were better to define it in the first intent as potentially alive. In any event, neither the microscope nor chemical analysis is able to indicate the existence in a germ proper of any fact or quality by which it may be discriminated from other cells which have no power of growth or development.

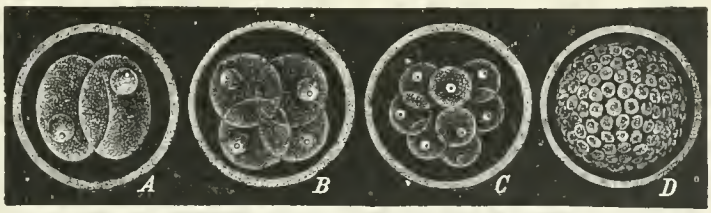
The better view is that every germ capable of becoming an organic body is itself a detached portion of the substance of some living organism already existing. For a long time Harvey's biologi-

cal aphorism, "*Omne vivum ex ovo*," or "Every living thing from *an egg*," was accepted as the correct expression for the beginning of the individual life, and the maxim has been but slightly modified by the more recent biology into the form of "Every living thing from something alive"—the distinction being that a cell may have all the qualities of a germ *except* the touch of life and yet remain incapable as any other not-living matter of becoming an organic body.

Scientific aphorisms of the beginning of organism.

Scientific tests have been carefully applied to germs of many kinds, and their quality clearly determined. The living cell is found to be filled with the chemical compound called proteine, consisting under analysis of oxygen, hydrogen, carbon, and nitrogen, with traces of sulphur and phosphorus swimming in much water. It should be observed that proteine is not a natural product; that is, it is always, so far as known, a constituent of *living* organisms or a product thereof —a conclusion which strengthens the belief that without life life can not begin.

Nature and movements of the germ life.



MANNER OF GERM DEVELOPMENT BY FISSION (SUCCESSIVE STAGES MARKED A, B, C, D).

Such, then, is the germ from which every organic body takes its rise. From this the living individual begins to be. Henceforth the history of the individual life is a history of processes, changes, adaptations, and, in a word, evolution. The first of these changes and transformations is simple growth. The germ, or living cell, begins to increase in size. This is the first manifestation, indeed, that the particle of matter in question is a true germ. It expands by a force seemingly within itself; but at first without other modification in character. It remains under the first expansion simple and homogeneous.

History of the individual a history of transformations.

The second stage of the evolution is marked by the appearance of a stricture corresponding to the equator of the cell by which a division begins to be effected, and two cells produced instead of one. Each of the two parts assumes, in turn, the form and character of the original; but the division is not complete, the substance of the two cells continuing to flow in common under the line of stricture. Around each of the two lobes lines of division appear, and *four* parts are produced instead of two, and these four, by division, become *eight*, each of which retains the exact characteristics of the original germ. Thus is produced what is known as a cell aggregate, which is the first stage in the advance from the germ toward complete organic being.

In what manner the cell organizes by process of fission.

The question at once arises by what means this first enlargement of germ life is effected. Whence comes the material which the cell uses in its own enlargement? Certainly not out of nothing. The cell has the power of appropriation. It has this in virtue of the life-principle within. It draws to itself and absorbs the aliment whereby the increase in size and the other phenomena of division and multiplication are produced. The materials so gathered are not mechanically distributed as if they were packed

How the materials of cell growth are gathered.

between the parts of the living cells, but are absorbed and assimilated with the substance thereof, or, in a word, digested.

The next stage in the evolution is the formation of what is called the *gastrula* out of the cell aggregate. This is accomplished by a series of transformations such as the production of the *archenterom* and its transformation into an embryonic stomach. The cells composing the first aggregate take the form called the *planula*, which is next doubled in on one side, as if by external pressure. The processes are somewhat occult, and may be traced by the curious reader in the pages of any modern work on physiology. It is sufficient to say that with the formation of the gastrula the rudiments begin to appear of the different parts of the organism that is to be, namely, the epidermis, or outer skin, the intermediate tissue, the alimentary canal, and a system of nerves.

Formation of the gastrula and archenterom.

The process of organic life—the preparation for a complete individual—is now fully under way. Assimilation continues, the matter being drawn primarily from the body of the mother and ultimately from the nutritive substances of the proximate environment. Growth also continues, and the embryonic organism begins to manifest that distinction of parts and outline of organs which in the aggregate are to constitute the living being that is to be.

Further evolution of organs and parts.

At length, after successive stages of growth and development, the new creature is ready for deliverance to the outer world. This process is effected by several methods. Some animals are oviparous, or egg-bearing; that is, the ova within the body of the mother are developed to completeness, usually inclosed in a chalky shell, and deposited in a suitable situation for the secondary process of fecundation. This consists in subjecting the eggs to heat—generally derived from the mother's body—and to other favoring conditions during which the processes above described, reaching from germ life to organic life, are completed, the shell broken, and the new organism liberated into the same conditions as the adult parent. In the case of the viviparous animals, the whole process of embryonic development takes place in the body of the mother, until the offspring reaches the limit of its first stage of being, when it is delivered to the new arena of life independent of the mother's body.

Manner of delivering the new creature to its environment.

It is not needed to dwell in extenso upon facts and modes of life which in the case of the individual are well understood. The whole course of organic development, as the same is illustrated in the individual being, is well apprehended, and has been demonstrated by observation and made of record until hardly any feature of the process is any longer obscure. But it is only in recent times that the discovery has been made of the fundamental identity of the methods of development in the embryonic life of the different orders of animals. There has been found to be no discoverable difference in the process by which the germ expands into organism in the several species and orders of living beings. The process is the same in the sponge as in the cœlentera; in the worm as in the echinoderm; in the tunicates as in the anthropods; in the mollusks as in the vertebrata. Indeed, in all the forms of life, above the protozoans, the modes of development from the germ to the organism are fundamentally identical.

Fundamental identity of method for all living forms.

This fact is the first stage in the extension of the law of evolution from the individual to the other orders of being, and finally to universal nature.

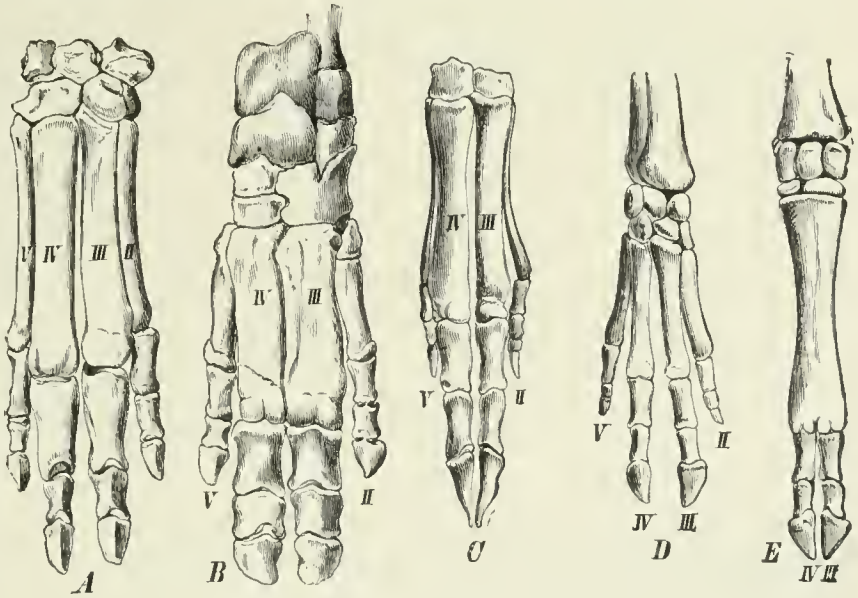
The next stage is like unto the first. This is reached in the discovery that not only are the processes of germinal and embryonic life identical in the individuals of the various species and orders of animate existence, but that the fundamental structure of the various kinds of animals is essentially the same throughout, with only such variations and modifications of the common pattern as have been produced by adaptation to certain conditions of life by the exigency of environment.

In the concept of general nature, the differences in the structure of the various orders of being were aforetime greatly exaggerated. Mere sense of sight and touch were used as the basis of judgment respecting the degree of divergence between one kind of animal and another kind. Until in recent times no scientific tests were applied to measure by a truer standard the existing differences in the bottom plan of universal nature. To the eye the bird was sufficiently unlike the fish, and the fish unlike the mammal. What similarity might the unaided sight of an untaught man discover between a frog and a squirrel, between a lizard and a hawk?

The natural senses exaggerate differences of structure.

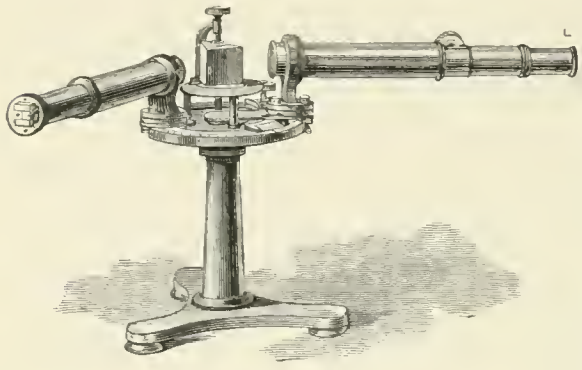
By the scientific method of observation, however, the likenesses in the framework and general structure of all the orders of living beings begin to appear, and the unlikenesses to disappear. It is found by the tests of science that the differences between animals are superficial, and it might almost be said fallacious, whereas the likenesses are fundamental and real. We here speak of the likenesses existing among the mature animals of different species and orders in the essentials of their structure and form. One not familiar with the fact must needs be astonished to note how, under the investigations of comparative anatomy, the fundamental parts of all living creatures more and more approximate a common type, from which the several species and varieties have been inflected to a certain limit only by the conditions of environment, including the operation of natural selection, or struggle for life, and the survival of the best. The skeletons of all vertebrates approximate a single pattern. This pattern in

Fundamental structural identity of all living forms.



LOWER LIMBS OF UNGULATE ANIMALS—SHOWING THE PROGRESSIVE DEVELOPMENT (MARKED A, B, C, D, E) OF ORGANS.

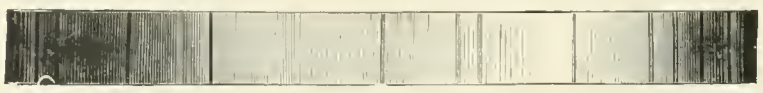
turn approximates the basal structure of the invertebrata; and so on with the enlargement of the investigation all animate beings are seen to approach to one common rudimentary form, insomuch that the inquirer might be induced to believe that nature has had but a single pattern in her laboratory of possibilities!



THE SPECTROSCOPE.

The effect of these discoveries in biology must needs be great in leading the mind toward a wider concept of uniformity. First, we have the actual demonstration of the modes and processes by which mature organism is reached in the case of the *individual*. In the next place, we discover that the same processes and methods of expansion and development take place in the individuals of *all the orders of life*. The *modus operandi* covering the progress of life and of living forms from the germ through certain intermediate stages to complete organic structure is identical in all orders, species, and varieties of living being above the grade of the protozoa. In the third place, a scientific examination and classification of the completed structural parts of all animals shows an astonishing likeness amounting to virtual identity *for every kind of organism*, whether mammal, bird, or reptile, whether vertebrate or invertebrate, or mollusk, whether of the highest or lowest grade of animated existence. Everything approximates a common type, and indicates in terms not to be mistaken the fundamental unity of the plan on which all varieties of animal life have been produced.

The mind discovers the law of uniformity.



SOLAR SPECTRUM.

It is doubtless true that certain other discoveries made in the domain of natural science have tended in recent times to promote and suggest one general law of uniformity for all the processes of nature. The tendency of science in the nineteenth century has been toward what may be called the integration of universal nature. By means of the spectroscope a knowledge has been acquired of the constitution and character not only of the planetary worlds, but of the sidereal heavens. Reviewing the nature of these discoveries, it appears that the human mind was in expectancy of a different kind of knowledge from that which came by the revelations of spectroscopic analysis. Instead of expecting to find the universe a unit in its fundamental characteristics, it would appear that expectation reached rather toward diversity, novelty, incongruity, and in short a different order for the upper worlds from that established in our own.

Integration of all nature established by science.

SPECTRUM OF IODINE VAPOR.

All such anticipation was disappointed.

Instead of unlikeness, likeness was discovered; instead of heterogeneity, identity; instead of contradiction and novelty, one law and substance for the whole. Hydrogen and carbon and calcium and sodium were found above as well as beneath, in the distant stars as well as in our solar group of worlds. The phenomena of combustion, of transformation, the suggestions of growth, of life, of mutation, of maturity, and death were found everywhere, indicative of the substantial unity in character, aspects, and offices of all worlds with our own and the system to which it belongs.

Scientific progress discovers the unity of the universe.

In like manner chemical progress has tended to one thing out of many. The old chemistry has passed away, the new has taken its place. One of the most striking aspects in this transformation has been the discovery that the many elements formerly supposed to constitute the materials of nature are probably reducible to a few, and possibly to one. Of the sixty or seventy elementary substances which were accepted as such by the chemists at the beginning of the present century, all have been reduced to four or five principal modes of motion and sensation with the strong probability that the further reduction of these to a single one will be effected. This discovery that the substance of all nature is really but one substance, or at most but a few constituting those "permanent possibilities of sensation"[1] which we call matter, has conduced powerfully to bring in the concept of unity, not only in material nature, but also in the realm of organic life under law.

Chemistry shows the oneness of material nature.

Such in general were the scientific antecedents of the new doctrine of the origin of species by natural selection. The theory of evolution, however, came by observation and experiment. Darwin was a traveler, an observer of nature. Though thoroughly versed in the biological theories that had preceded his age, he nevertheless relied upon generalizations which he himself made from facts collected from the natural world. Though he owed to his grandfather a certain hereditary type of mind favorable to the formation of large theories respecting the laws of man and nature, he none the less pursued his lines of study as an independent inquirer and with no apparent predisposition for any class of opinions. In 1859, as already stated, he published his *Origin of Species by means of Natural Selection*, and two years afterwards his *Descent of Man*, in which the new doctrine of the order of life was fully set forth and defended by an extent and variety of observation and an acuteness of deduction which must ever remain a surprising event in the intellectual history of the nineteenth century. His studies included far-reaching excursions into both the animal and vegetable kingdoms, but more particularly the former. His research and industry were equaled by the lucidity of his reasoning. His conclusions reached up by steady approximations from the lower to the higher forms of life, including man himself as the highest of all, but under the dominion of the same laws which determine the character of the lower species.

Evolution the product of observation and experiment.

[1] Matter may be defined as a permanent possibility of sensation.—*John Stuart Mill.*

CHAPTER XII.—THE TRUE EVOLUTION.

HAT then is the doctrine of evolution? First of all, it is the theory that the higher forms of living being, including man, are the descendants of some ancient, lower, and extinct forms which have been lost in the struggle for life and replaced by the stronger and fitter of each respective kind until the present species have been produced. The process is in general what is called natural selection. The terms of this expression were chosen by Darwin after his study of the life of animals under domestication. He perceived that in these there is a *choice* by the stock-raiser of the best of each kind and a rejection of the unfit; that by these means a given species is perpetuated and improved along certain lines of development which are desired in preference to others; and that, in short, the domestic animals are largely the result of the intelligent choice or selection of those who produce them. It is thus that certain qualities attractive and beneficial in given breeds are preserved, augmented, transmitted, and perfected by a law of adaptation, and in particular by the mating of the sexes so as to intensify the desirable qualities of the parents in the offspring.

Darwin's discovery of the law of natural selection.

These hints, gathered from a field of inquiry to which Darwin devoted a great amount of study, furnished the word selection; but the question was whether living beings not under the dominion and intelligent choice of man are influenced in their development by the action of a similar law. Of this law—of its existence and character—Darwin may be said to have been the discoverer. Making a wide excursion into the open field of nature, he found that a law of selection exists here also, by which, or in accordance with which, the character of each species of living beings has in the main been determined. In a word, he discovered that there is a *natural* selection prevailing in all parts of the domain of life by which the fittest of each kind of living creatures are chosen and the rest rejected, the criterion of fitness being determined by the nature of the environment. This is to say that every living organism is more or less fitted by its powers to its surrounding condition in the natural world; more or less able by its organs and faculties to secure for itself the means of subsistence; more or less fully equipped, as compared with its fellows of the same species, to gain place and footing in the somewhat slippery contest for the most advantageous situation—for the supply of its wants and the exercise of its natural appetites. Those creatures that are thus naturally or fortuitously best fitted for the struggle of life succeed in the competition, while the weaker of the same kind fall back in the race and disappear.

Survival of organic forms by natural selection.

Such is one of the leading notions which enter into the doctrine of evolution. It is known as natural selection, or the survival of the fittest. Darwin says:

"Let it be borne in mind how infinitely complex and close-fitting are the mutual relations of all organic beings to each other and to their physical conditions of life; and consequently what in-

Darwin's explication of the law and its expression.

finitely varied diversities of structure may be of use to each being under changing conditions of life. Can it then be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life should sometimes occur in the course of thousands of generations? If such do occur, can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others would have the best chance of surviving and procreating their kind? On the other hand, we may feel sure that any variation in the least degree injurious would be rigidly destroyed. This preservation of favorable variations and the destruction of injurious variations I call Natural Selection, or The Survival of the Fittest."

It will be noted that this law involves the fact called variation. Unless variation be admitted, then there could be no such thing as selection, whether natural or artificial. But the fact so-called does exist universally in the domain of life. It exists naturally—in virtue of the very conditions under which organic forms are produced and developed. Living organisms, instead of being alike, are unlike. This is said not of the fundamental plan of their structure, but of the particular features which characterize each individual. The members of a given variety of living forms are discriminable the one from the other by differences which they bear. Perfect likeness is nowhere found. The discovery of two creatures however nearly related and produced under however nearly identical conditions, which are

The law proceeds by variation of form and function.

VARIATION OF ANIMAL FORMS.—(1) UNDER NATURE—COMMON WOLF

indiscriminable by manifest differences in their structure, qualities, and physical features, is impossible. No likeness of parents, or careful preparation of antecedents, or accidental results of creative forces, or nurture and development, can produce two organisms which are the same in all particulars. It is doubtless true that in all the incalculable millions of bushels of wheat which the world has produced no two grains were ever precisely alike. Nature in all of her doctrine of evolution. But they are only the beginning of the phenomena. Given the unequal capacities of living organisms in the arena of life, and we have the clue to the real variation which is to follow. The individuals of a given species begin their existence by gathering sustenance and fitting themselves to their environment. But those having the superior powers accomplish this work most successfully. In doing so

Variation intensified by growth and adaptation.

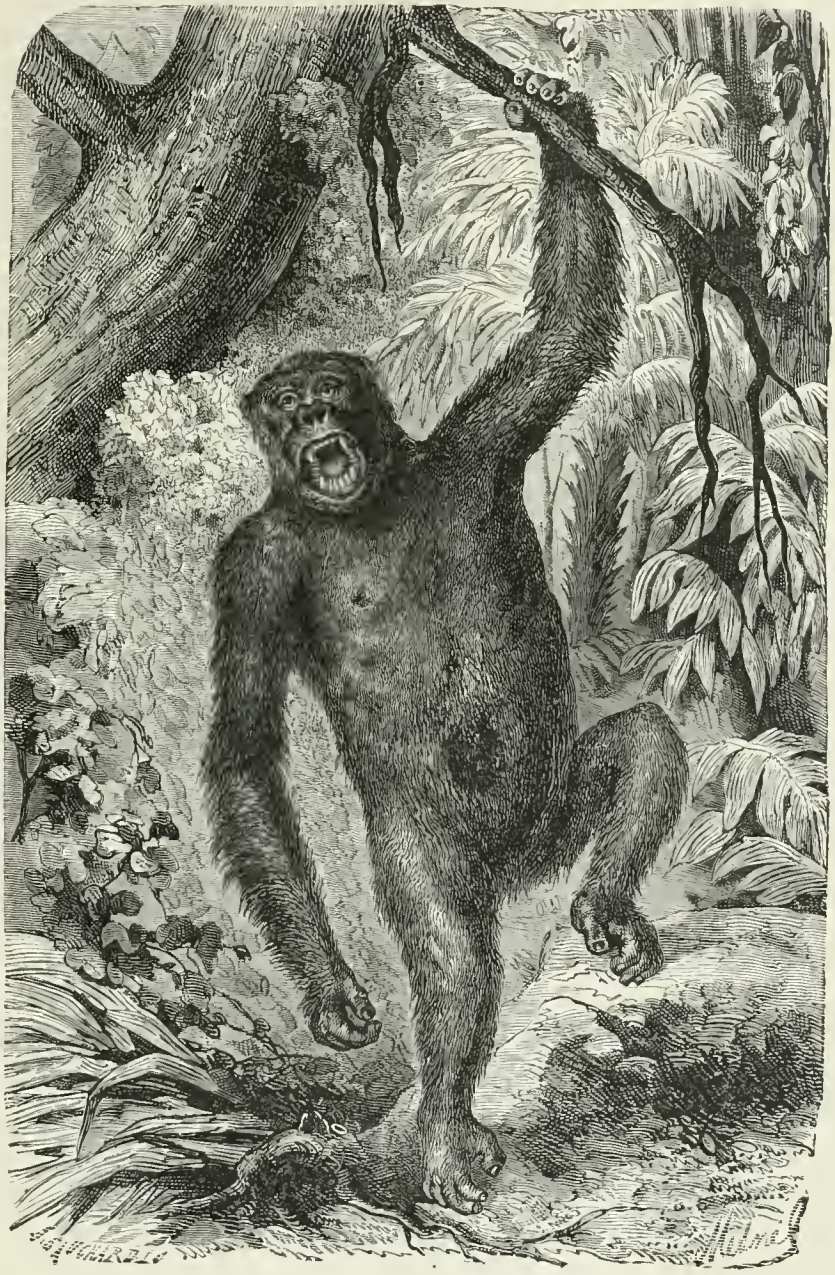
VARIATION OF ANIMAL FORMS.—(2) UNDER DOMESTICATION—ITALIAN GREYHOUND.

mains avoids with everlasting persistency the exact repetition of any of her results. It therefore happens that when the living organisms which are to inhabit the world are projected into the arena of life they come with unequal powers and capacities, with differences which, though in many instances minute, are nevertheless appreciable in the contest which is to ensue, with fitnesses more or less complete for survival and the procreation of their kind.

These facts constitute the basis of that variation which is so fundamental to the they augment and make permanent the very faculties and organs by which success is attained. The use of the organs with which they are endowed increases their development, and the offspring of these successful organic forms are born, not with the rudimentary powers which were possessed by their parents, but with the developed powers, instincts, and capabilities which their parents possessed and transmitted in procreation.

There is thus originated a series of forces culminative in their action and

tending to the perfection of organic life in a certain direction. Meanwhile, however, those original organisms which were not so well endowed have either wholly perished or have been crowded from the line of development taken by their successful competitors, into a deviating course of life where the conditions are somewhat, perhaps largely, different from those surrounding the lines followed by the first group.



GORILLA TAKING HOLD WITH FOREFOOT.

It can but be of interest to note a few specific instances of the operation of the law of survival. Take, for example, the case of that large number of flowering plants which are perpetuated by the transfer of pollen. It is thus that fecundation is effected and the given species extended over wider and still wider areas of growth. Whatever favors the distribution of pollen will therefore be promotive of the welfare and rapid multiplication of the species. This work is usually effected by the agency of insects traveling by wing from blossom to blossom and carrying with them *per accidens* the fecundating principle. It will be observed that the motive of this

Specific examples of the law of survival.

work is, as it were, unknown to the insects themselves, they being busy with another instinct and appetite. This other impulse is the seeking of food. The cells of flowers contain many substances, notably honey, which attract the insects and thus bring them into contact with the pollen.

It is needless to say that that particular blossom, or particular species of blossoms, which, under given conditions, secretes the largest quantity of the most delicious sweets will draw the greater number of insects, and that the pollen thereof will be most widely distributed. If any particular plant, or variety of plants, through weakness, or semisterility, or any fortuitous circumstance, should be poorly supplied with the attractive nectar, that variety would be neglected. The general result would be that the favorite plant would, with the next season, secure a wider area of growth with all the better situations. The tendency thus started would increase in influence. Slowly, perhaps, but steadily the plants having the best supply of nectar would run ahead, preöccupy the best ground, overgrow their competitors, and, in short, become an example of the survival of the fittest.

Blossoming plants flourish by secreting nectar.

If we pass up to the animal kingdom, we find this law still more strongly operative—still more powerfully determinative of given results. It is among animate beings that the struggle for existence has its widest and most important exemplification. It was here, indeed, that the first glimpses of the law were caught. It was in the closing years of the last century that Thomas Robert Malthus published that *Theory of Population* which has ever since borne his name. To him belongs the honor of having first formally developed the idea of the encroachment of the animals of the world upon the means of subsistence. He perceived that all animal life is procreated in a geometrical, not in an arithmetical, progression. However slow the rate of increase may be in any given case, the ratio is always a geometrical series. If a given species of animals reproduce in such a rate as to double the number in four years, then in eight years the number will be quadrupled, and in twelve years increased to eightfold the original number. If the number be not doubled for twenty-five years, then with fifty years it will be quadrupled, and so on in a geometrical ratio.

Explication of Malthusian theory of population.

The animals of the world subsist ultimately on the products of vegetation. Plants, multiplying by their seeds, increase also in a geometrical ratio, so that at first glance it would appear that the increase of animal life and the increase of the means of subsistence are coördinate phenomena; but a moment's reflection will show that all plant-life is *fixed* in the earth or water. There is thus a natural limit to the extent of the increase of any given variety. A certain kind of plants may, indeed, multiply under the geometric law until a given space of producing soil, as of an acre, is occupied. After this limit is reached, all that the given species of vegetation can do is to occupy and fill to repletion another acre, and then another. But this process is addative, or simply arithmetical, and not geometrical. In a word, nature has provided in the limitations of the soil of the earth a law by which the rate of increase in all the vegetable products of the world is changed from a geometrical to an arithmetical series; but in the case of the

In what manner animals encroach on means of subsistence.

animals, they being not so fixed to the soil, the geometrical ratio of increase continues operative; which is to say that the animals, multiplying more rapidly than the means of subsistence can multiply, encroach with the force of the calculus on the food-supply which nature has provided for them. There is, therefore, only one thing remaining to equalize the two forces, and that is the introduction of another law, or laws, by which the effects of the geometrical ratio in the increase of animate beings shall be curtailed and limited in its operation, so that the means of subsistence may keep pace with the demands thereon.

The law whereby the geometrical ratio in the multiplication of animals is restricted to the means of subsistence is, in a word, the struggle for life—the survival of the fittest. Among the animals this struggle goes on forever. It assumes one of three forms:

The three forms of the struggle for existence.

1. The struggle of the individual with the individual of the same species.

2. The struggle of the individual of one species with the individual of another species.

3. The struggle of the individual or the species with the physical conditions of life, commonly called the environment.

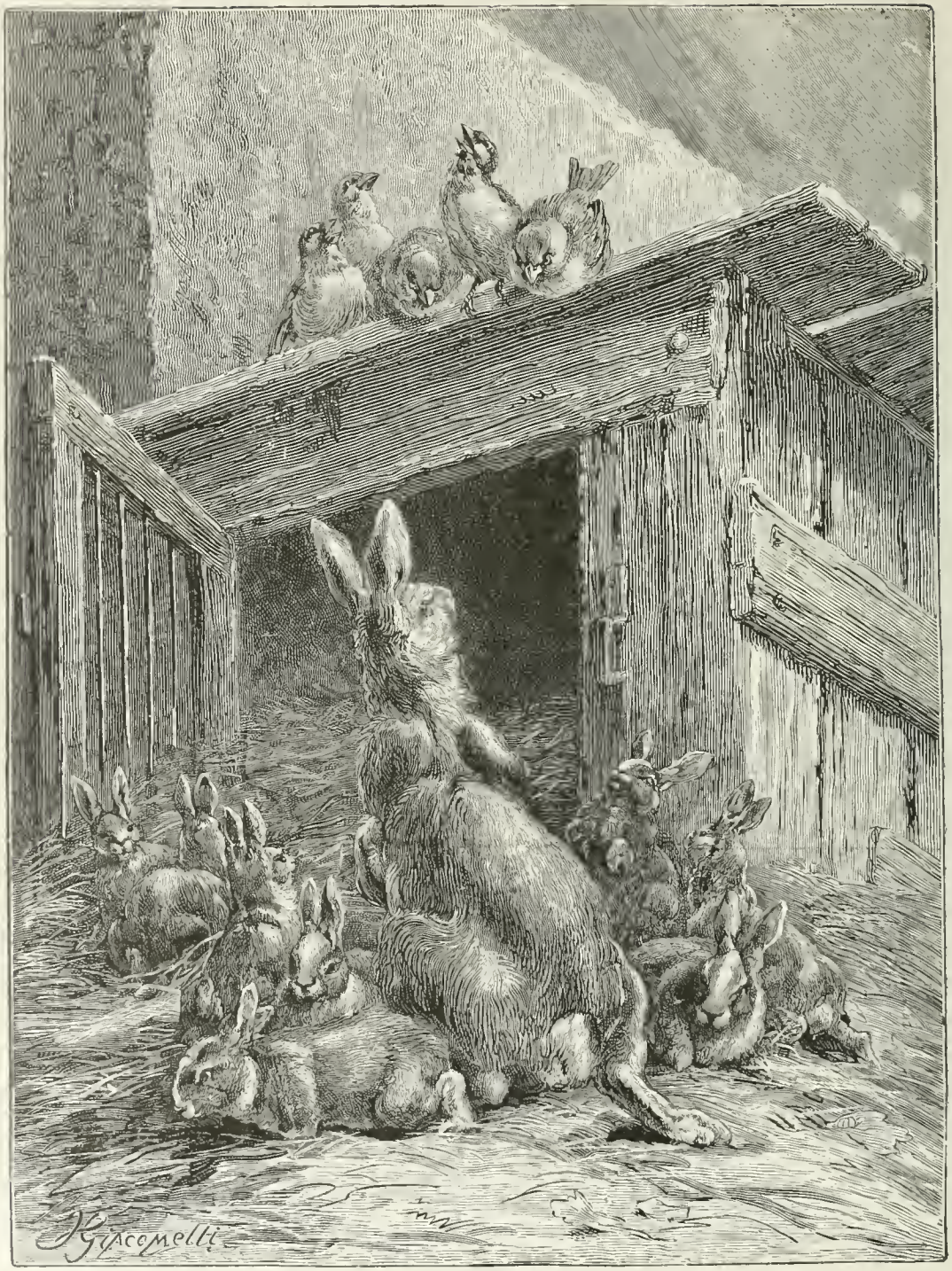
The first kind of contest covers all the varieties of competition which one individual of any species has with another individual of like kind with itself. It is a well-known fact that nature is extremely prodigal in the provision which she makes for the procreation and distribution of the germs of every species of organic life. She always provides for much more than can exist. In the case of some plants the number of seeds produced is so incalculable that if it were not for the prodigious waste and the countervailing laws by which the spread of that species is restricted, it must in a short time occupy the whole earth to the exclusion of all other forms of vegetation. Thus it is that the very seeds of life begin a competition which can only end with the death of the organic forms potential in them.

On the land and in the deep the same phenomenon constantly reäppears in all the forms of existence. It is estimated that a single codfish will, under favoring conditions, in one season produce three million eggs! It is needless to point out the fact that at this rate of increase, were not the most efficient and active restraints imposed upon it—including competition for the means of subsistence—the whole Atlantic bed, from shore to shore, would in the course of a few years be filled to the surface with a solid mass of this superfecund species of fish. It can not be doubted that but for the action of very efficient countervailing agencies the quail of North America would in a short time multiply to the occupation of all fields and groves and valleys, from mountain to mountain and from sea to sea. So also of the rabbits and many other species of ground animals.

Exuberance of life restricted by opposing agencies.

It may suffice to point out in this general way the rudiments of the great problem of life. Nor can it fail of interest to follow the investigation along the lines of those methods which are provided for the curtailment of life under the general law of natural selection. First of all, in the case of living creatures vastly greater numbers of eggs are provided than are necessary for the preservation of the species. Here the struggle begins in the destruction of the eggs of one species by the animals of another. Great and multifarious are the exigencies through

Curtailment of life begins from the germ and seed.



EXAMPLE OF RAPID MULTIPLICATION.—Burrow of Rabbits.—Drawn by Giacomelli.

which all eggs, as, for instance, the eggs of birds, must pass before they can come to the stage of life and organic development. Every nest is exposed to the vicissitudes of storm and flood. Every nest is a temptation as well as a seat of

hope and despair. The living enemy lurks on every hand. No eyrie is so inaccessible as not to be approached by the stealthy march of the foe. Then come the vicissitudes and hardships of climate. These bear alike on the germs of life and upon all stages of organic development. A single winter of unprecedented severity, like that of 1607–08, is sufficient to work havoc and decimation with the plant and animal life of large areas of the world. After such a disaster the species surviving from the ordeal must, as it were, begin anew, and in so doing only the hardier stocks are preserved as the progenitors of new races.

Struggle of the individual with others of its species.

But we are here to speak more particularly of the contest of the individual with the fellow-individual of the same species. In this respect the struggle of life is perhaps the most remorseless fact which the student of nature is obliged to contemplate! It is a conflict of the strong with the weak, in which the strong always prevails and the weak always perishes. As a rule, the hungry animal seizes from his fellow the one portion of food which is not sufficient for both. The strong takes it; the weak loses the battle. There is neither remorse nor pity. True, to a certain extent the parent animal, the mother in particular, cares for her offspring; but this law holds only to a certain limit. Beyond that there is neither preference nor sympathy nor recognition. Even while the instinct of parental protection still prevails, it is counteracted by appetite, and, except in the case of the human species, the offspring itself is ruthlessly devoured by the parents. Even in our own kind this horrid circumstance in the struggle for life has been again and again repeated, as if to proclaim with a great voice over the whole arena of living being the one dominant law that the strongest shall live and the weakest go to the wall.

Passing to the war between individuals of different species, we find the conflict as wide and as universal as the domain of life. In the plant world the individuals of one species, stronger than the prevailing form in a given locality, obtrudes upon the existing kind, multiplies, and drives out the weaker species. The struggle goes on everywhere, from the conflict between one kind of cryptogamous plants, growing like a mold on the cellar wall, and another kind, its competitor, up to the struggle of one forest growth with another. The substitution of one entire forest for another kind is a common fact in the botanical history of the world.

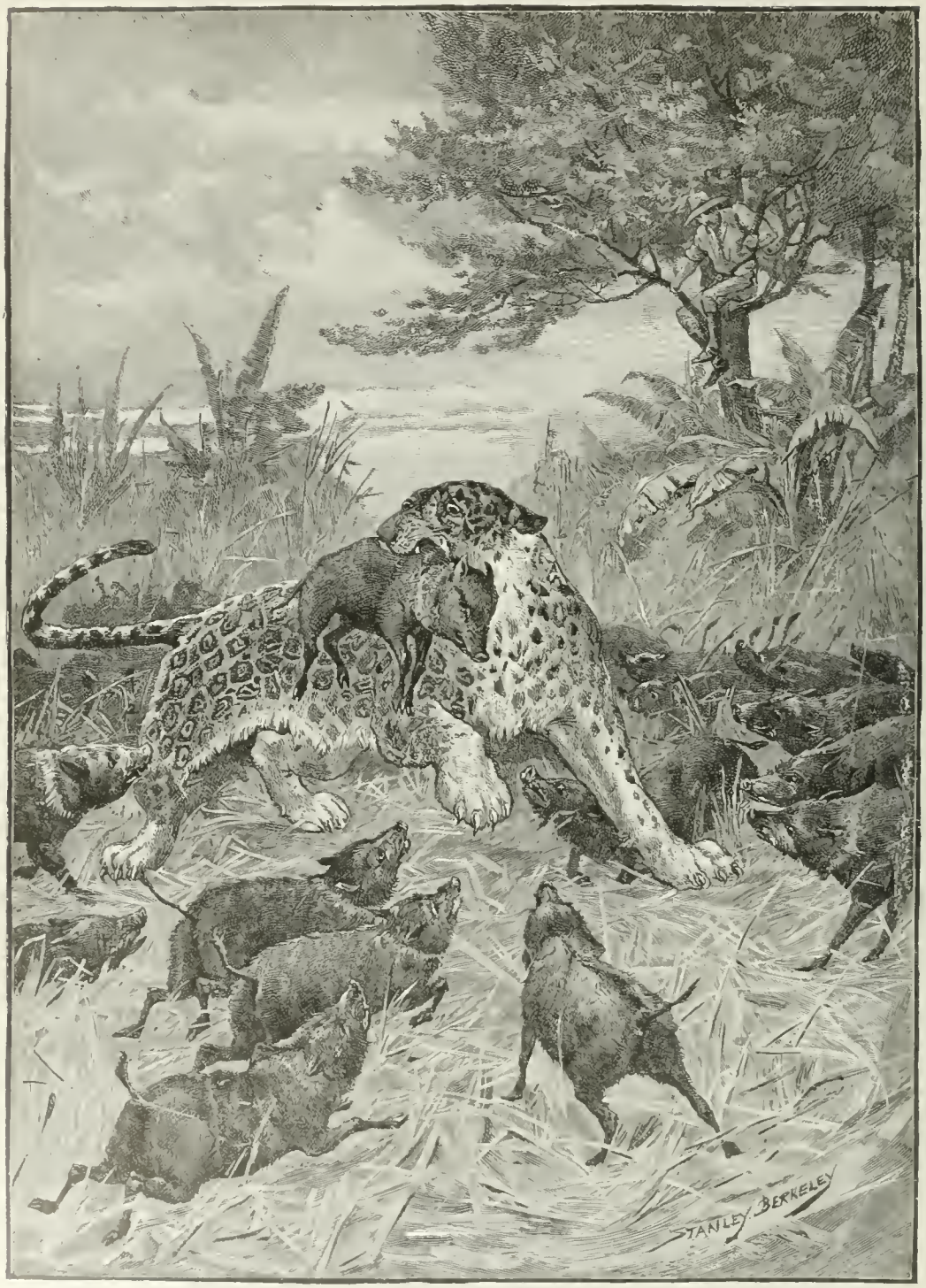
Plants of one species contend for place with those of another.

In the arena of animal life one species drives out another. The whole sea of animated nature is fluctuating along its entire surface from shore to shore with the varying vicissitudes of the conflict between the stronger and the weaker wave. Some of the waves follow the course of civilization. The black rat gives way to the brown, and the gray squirrel of the American woods retreats before his red rival. In other portions of the field the contest is waged between wide-apart orders of living beings. The carnivora devour the herbivora, fishing birds deplete the waters of their inhabitants, parasitic insects attack the strongest animals and reduce them to skeletons.

Battle for life between animals of different species.

Further and still further the vicissitudes of the battle extend, until all nature seems to be involved in one vast complication. In a given district of country cats are plentiful. They are of a strong breed, vigorous in procreation,

Illustration of the vicissitudes of the contest.



STRUGGLE OF LIFE—THE STRONG TAKES HIS PREY.—Drawn by Stanley Berkeley.

and eager in the pursuit of prey. They feed upon the ground mice of the district, and almost exterminate them. Everywhere, in meadow tuft or by the

roots of decaying stumps, or along the lines of fences, the mouse nests are hunted from their places. The parent and the young are alike devoured. With the disappearance of the mice the bumblebees greatly multiply; for the mouse is the great enemy of the bumblebee. The nest of the latter is constantly invaded and its contents destroyed or eaten by the enemy. With the destruction of that enemy the life of the bumblebee is liberated from danger; the nests are multiplied in all favoring localities, and with the hatching of the offspring the air is murmurous with their humdrum music.

Round about this scene spread the fields of red clover. It is by the agency of the bumblebee that the pollen of red clover is borne from blossom to blossom. Without such agency there can be no maturity of the seed, no germination, no preparation for an ensuing crop. It is a well-known fact that in a given season the first cutting of red clover finds no seed in the blossoms. It is only later in the year, when the bumblebees have gone abroad, that the seed crop is developed. Note, therefore, the extent of the correlation. Where cats are plentiful the mice are exterminated, the bumblebees abound, and red clover not only flourishes but prepares its seed for a more extended area of growth. Where cats do not exist ground mice flourish and multiply, the bumblebees are exterminated, and the red clover perishes for want of fecundation!

Correlations of red clover with cats, mice, and bumblebees.

These lines of vibration and vicissitude extend in all directions through the whole domain of life. They include not only animated nature, but the vegetable world as well. They knit together all the forms of living organisms in mutual dependencies by which the relative advantage and very existence of each are conditioned. They furnish the clues of a study which is world-wide in its extent and variety. He who runs may read the story of the unending warfare that goes on between the species of living beings —goes on from the insect battle on the under side of a leaf to the dropping of the tortoise from the eagle's claw; from the sting of the mosquito on baby's hand to the ferocious conflict of men with tigers in the Indian jungles; from the snap of the swallow's beak on the ephemeral gnat to the assault of the infuriated monster of the deep on the whaler's boat.

Law of conflict extends to the whole domain of life.

In the third place, the struggle for life is intensified by the resistance which the material world offers to the welfare and safety of every living creature. In some parts of the world, particularly toward the north, the vegetation and the power of nature to produce it are so limited that animal life of all kinds must be correspondingly sparse and barren. Certain regions of the globe become more and more bleak until vital phenomena first weaken, then sink to lower levels of development, and finally disappear. Besides this, nature, instead of being a safe, is everywhere a dangerous, arena. While she invites life, she opposes it and puts impediments in the way of its progress. Not infrequently she is a destroyer. The world has its cataclysms and physical commotions in which not only multitudes of individuals but whole races of living beings are swallowed up. Life stands always on the perilous edge of hazard.

Environment offers resistance to all living forms.

The conditions not only of health but of disease are present in the world. Epidemics supervene at intervals and sweep away or decimate existing species.

All living forms subject to disease and death.

The havoc of disease is seen not only where human kind has risen above the other orders of animated nature and civilized the world, but wherever life is found. It were a great error to suppose that the plant world, in a state of nature, is free from the ravages of disease—still greater to imagine that the lower orders of animated being are not visited by destructive epidemics. It might well appear to the calculating mind of Malthus that disease is one of the natural weapons by which the superabundance of life is beaten back into the dust.

STUNTED VEGETATION OF KAMCHATKA.

The general fact called climate, with the changes which it involves, contributes largely to the struggle for life. It would appear that every species of living organism is carefully balanced in its climatic environment. All living beings are sensitive, most of them highly sensitive, to the influence of even slight changes among the cosmic forces in which they swing. Whenever the turn of the secular wheel brings around an altered condition of earth or sea or air, that alteration is the catastrophe of many species of animals

and plants. Many more species are seriously affected by the change, some favorably and others unfavorably. Some are aided by the alteration in natural conditions, and others crippled for life.

Secular changes produce catastrophe to living forms.

The geological history of organic forms preserved in the earth's crust shows conclusively that the metamorphosis of species has been coïncident with the secular changes to which the earth itself has been subjected. Life, in a word, makes a new departure when the general course of nature is disturbed. Animals are changed in their forms and habits, not indeed *per ictum*, but gradually from one mode and aspect of activity to another. The distribution of plants and all forms of animated existence departs on new lines with every cosmic change in the environment.

Natural selection adjusts each living form to its environment.

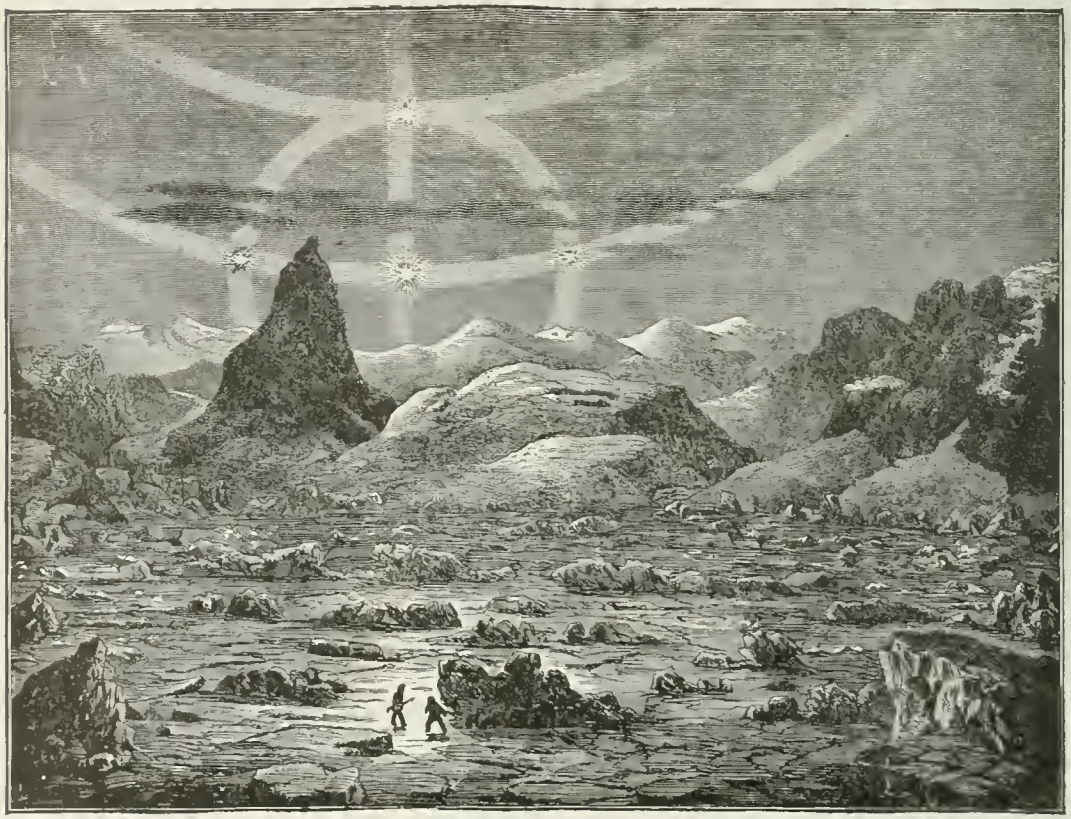
If we note with particularity the habits and vital capacity of any animal or species of animals in given zone and within a given area, we shall find the living being or beings in question to have been brought by natural selection into very careful adjustment with climatic conditions. The given animal is, for instance, capable of enduring the maximum cold of the winter in his latitude, but no more. He is fitted to bear the heat of the corresponding summer, but no excess thereover. He is in like manner balanced with the conditions of moisture and drought, and indeed with all the meterological and cosmical forces that hold him in his place. Any disturbance among these forces must seriously affect his welfare. Any swelling or perturbation of the secular laws overwhelms him, or drives him forth

MAN-LIFE LIMITED BY BATTLE WITH ANIMALS.

into a new condition of activity and a new form of specific development.

But these cosmical changes do occur. The islands and continents of our globe not only yield to the vicissitude of changing climate, but sink and emerge by turns from the sea. Terra contends, with Oceanus, and he with her. With each subsidence and upcoming of the land from the sea a new environment is prepared—a new field for animal activities. True it is that since the days of Sir Charles Lyell, the notion of vast immediate cataclysms and reconstructions of the globe has given place to the concept of slow but ever-operative changes in the forces that balance the world. At certain times, no doubt, crises are passed in these secular movements which produce a general alteration in the aspects and tendencies of organic life; but for the most part the changes are so slow as to admit of a gradual life-adjustment to the altered conditions as they arise. But the fact of climatic and cosmical disturbance exists, and the law of natural selection depends thereon in part for its efficiency and ultimate results.

Cosmical crises are attended with destruction of species.



NORTHERN LIMIT OF MAN-LIFE.—King William Land.

Still another active force in the struggle for life is what is called sexual selection. Mr. Darwin in his later studies was led by observation and experiment to dwell much upon this circumstance in nature as an efficient cause of variation. Here also the study begins with the methods of reproduction in the case of animals in a state of domestication. It is clear that where the animals under

Struggle for life on lines of sexual selection.

observation are domesticated and thus subjected to the intelligence and purpose of man, the largest and most striking results are produced by the adaptations of sex in mating. It may well surprise the inquirer that a principle so widely known and acted upon, perhaps from antiquity, should not have suggested to the early biologists the extension of the law into the realm of untrammeled nature beyond the limits of man's agency. The principle in question has been so much employed that the leading aspects of animal life in a state of domestication have been produced by the skill of the breeder, by the knowledge and application of sexual selection.

Nearly every species of domestic creature has been brought to its present state by this method. Generation after generation the breeder and raiser have chosen to develop varieties on certain lines of excellence, and almost the single force which they have employed has been the mating of the sexes according to the criterion of the quality desired in the offspring. We may well be surprised to look around us in the arena of civilized life where domestic animals so much abound and to note how each creature and each variety of creatures have been perfected by this easy and manifest method of sexual adaptation. The great breeds of Teeswater cattle have been produced by the systematic choice of favorite qualities in the male and female, and the mating of those animals in which the desirable qualities were most highly exemplified. So also of the Alderneys and the Holsteins. So also in the Polled Anguses, in which the variation has proceeded to the extent of the absolute obliteration of horns and the rounding into smoothness and symmetry of the head over the part from which the horns once sprang!

Domestic animals brought to present forms by sexual matings.

The various breeds of domestic fowls have in like manner been brought to the wide differentiation which we see among them. And so indeed through the whole range of those creatures which man has reduced from wild nature to domestication. Perhaps the different species of dogs illustrate the action of the law as well as any. Here it would seem that the very extremes of possibility have been reached by the simple process of sexual selection. From the minute and delicate poodle to the tall, muscular Irish staghound—perhaps the fleetest of all

BRITISH ISLES AND SURROUNDING SEA—SHOWING HOW A RISE OF SIX HUNDRED FEET WOULD MAKE GREAT BRITAIN CONTINENTAL.

Wide range of differences produced by domestication.

animals—and the tremendous mastiff and St. Bernard the work has been accomplished by simply selecting, generation after generation, the individuals in which the desirable qualities have begun to appear and by mating these individuals together, thus accumulating the peculiarities sought for, intensifying them, fixing them, and sending them down with an accelerated force to the next generation.

So powerful is the action of this principle of sexual selection, so general its application, and so universal its efficiency, that in the hands of man it can easily be reversed and made to undo its own results. It is only needed to adopt the method of mismating in order to obliterate in a few generations the peculiarities which have been developed through many. The crossing of breeds, as is well known, produces a mongrel midway in size, color, features, instincts, and modes of activity between the two mismated parents. The strong differentiation which sexual selection so easily sets up, perpetuates, and at length fixes in permanent varieties, may be easily smoothed out and leveled down by the reversal of the same principle.

Results of selection may be undone by reversal of process.

With these well-known facts before us respecting the laws of animal development when the same are applied to creatures in domestication, it would seem that the extension of the principle to all animated nature ought to have been long since discovered. But such was not the case. Until the last half of the current century it appears not to have been suspected that the very instincts of animals themselves, in a state of nature, are as effective in producing differentiation and a development of varieties, though perhaps not so rapid and tangible in results, as are the skill and persistency of the breeder. Investigation has shown that there is a *natural* as well as an artificial law of sexual selection; that, indeed, all animated nature is pervaded with an instinct which, under various forms of manifestation, works out at length the same or analogous results with those secured by intelligent breeding. The habits of animals in a state of nature have been so well observed and the results generalized that it is no longer to be doubted that many of the most striking differentiations and varieties in animal life have been produced by that form of adaptation between the male and female which goes by the name of sexual selection.

Nature also selects; late discovery of the law.

A few examples of this law and its results in the arena of wild nature may suffice. The stronger males of almost all species of animals beat back the weaker, and become the progenitors of the next generation. Sheer force is thus one of the primary elements in the problem. To this nature lends herself a willing servant. In the case of all the animals bearing deciduous horns there is a special preparation for the epoch and fact of mating. The horns are for battle, and the battle is for the possession of the female. The season of battle and of procreation having passed, the horns are cast, and for a while the males are horaless; but with the approach of the next season of struggle the horns reäppear, expand, and harden for the fight.

Examples of sexual selection and results therefrom.

Meanwhile, in many instances the female of the species in like manner make choice, sometimes most persistently, of certain males. In some cases the choice is determined by size and strength or fleetness; sometimes by color or form, and

Both sexes and all species choose in a state of nature.

sometimes by occult dispositions which it has been hard to discover. Among the birds, color and plumage have performed a large part in the work of sexual selection. Sometimes it is the male and sometimes the female—generally the former—which is the most highly adorned and developed in variety and extent of plumage and brilliancy of hues. But until the present age it was never suspected that these strong marks of peculiarity and attractiveness had themselves been produced through hundreds of generations by the preference of the females for the most beautiful among the males. Everywhere, from the hugest forms of life now existing on the earth down to the glowworm in the grass, the same principle of sexual selection exists and works out, slowly but surely, its cumulative results in the differentiation, establishment, and perpetuation of the varieties of animal life.

Still another circumstance should be noted as bearing a part in the production of species. This is the occasionally sudden, or at least rapid, departure of offspring from the parental type. It sometimes happens (and by happening we do not mean a work of chance, but only that the causes of the phenomenon are unknown) that a newborn animal exhibits qualities, features, instincts, and modes of activity so widely divergent from not only the immediate parents, but from the whole ancestry as far as known, that it might well appear that a new species or variety had been produced *per saltum*.

Occasional sudden departures from ancestral types.

It is not clearly known what the ultimate effects of these sudden departures may be in the general economy of animal life. Some observers have concluded that such phenomena are anomalous, and that the peculiar progeny born in unlikeness to the parental stock tends in succeeding generations to sink back to the type from which it is derived. Others are of opinion that, in some cases at least, the abnormal form perpetuates and fixes itself as a new variety, or at least tends to do so until it is counteracted and obliterated by the countervailing forces of breeding and environment.

Question of the results of this phenomenon.

(1) DEER HEAD WITH ANTLERS IN THE "VELVET."

Several other elements besides those enumerated in the preceding pages enter into the struggle for life, and help to constitute the general doctrine known as the survival of the fittest. This doctrine is the key of the theory of evolution. That theory we are now ready to apply to the general scheme of animated nature, and to show to what extent and in what way it explains the phenomena of organic life.

In the first place, the nomenclature of science should be noted as precedent to a clear apprehension of the subject. Nature is divided first of all into great groups of sensible facts called Kingdoms. There is a Mineral Kingdom, constituting the great mass of visible nature; a Vegetable Kingdom, rising therefrom and fixed as we have seen to the earth as its basis of growth; an Animal Kingdom, including all those organic forms of being which rise above the somewhat indefinite horizon of plant-life.

Nomenclature of science; division from kingdom to the individual.

(2) DEER HEAD WITH MATURE ANTLERS.

Kingdoms are divided into Orders, or great groups of facts discriminated from each other by a few leading and general lines of demarkation. Orders are divided into Suborders; these into Genera: these into Species; Species into Varieties, and Varieties into Individuals. Besides this right line we have such words as Classes and Families to designate certain groups in the order of descent; but in general the analysis runs down in the order given above from Kingdoms, the highest, to Individuals, the lowest and last results in the classification of the forms of nature.

In the foregoing examination we have seen in general how the law of evolution works in the production of the individual life. This part of the *modus operandi* has been determined and established by observation and experiment, and is, indeed, so amenable to the common experience of mankind as to admit no element of doubt or uncertainty. The history of every organic life in the world is common to the whole domain of nature. From the germ to the embryo, from the embryo to the living organism, from that to maturity—such is the one history which runs uniformly through the whole realm of organic being; that is, it is the one history of the individual life. The question, then, is to what extent the principles which govern the evolution of the individual life are applicable in the case of varieties, species, genera, orders, kingdoms, and finally of universal nature. Have or have not the various differentiations from common types upwards from individual to specific and then to generic life been produced by the operation of the same laws which have developed the individual from its germinal to the perfected form?

Law of the individual is the law of the species.

In the preceding discussion we have seen the hints and outlines of the widen-

ing of the law of evolution from the individual to the variety. We have seen how variation is produced in organic form, instinct, and mode of activity by the agency of natural and sexual selection. We have noted the manifest and indisputable evidences of the results of natural selection in domestic animals, and further on in the free arena of animated nature beyond the limits of man's agency. Science has recorded the results of the law in thousands of instances, showing unmistakably that the variations from individual types into varieties have been produced by the forces which are common to the whole natural world in the struggle for existence. The question arises whether the law extends still further and is sufficient to account for the difference by which species is discriminated from species and genus from genus.

Varieties produced from individuals by law of variation.

It has been the particular excellence of biological inquiry in our age to answer this question with some degree of confidence. The work was begun with an examination into the relations which one species of living organisms bears to another. It was noted by Darwin, and had indeed been known to his predecessors, that some of the so-called species of animals and plants lie much nearer together than others which seem to be separated by a wide chasm. Closer scrutiny showed that in many cases it was doubtful whether a certain species so defined should be classified by itself as such, or should rather be regarded as a variety of an approximate species. Again it was found that some of the so-called varieties had departed so widely the one from the other that they might, without straining the scheme of nature, or more properly violating the diagrams of science, be classified as distinct species. Still further the inquiry was pressed, until the principle was revealed that in all probability the whole scheme of animated nature is only one vast variation from a common type.

All animate nature a variation from a common type.

This discovery was the flash of radiance that brought in the new concept of universal nature. Under its light species passed away; genera fled; orders and suborders disappeared, and nature was seen to be one vast and universal scheme, evolved from a few germs or one single germ, spreading out therefrom like a tremendous fan with widening radii, influenced in their course by the same laws and principles of development which govern the evolution of the individual from the life-cell of its origin.

Obliteration of species and all fictitious divisions.

The development of this new concept of organic life considered as a whole was largely the work of Darwin. In the hands of others, of a more philosophical turn of mind, notably in the alembic of Herbert Spencer, the doctrine of evolution has been widened and applied to nature as a whole—has been systematized, illustrated, and confirmed by speculative thinking, until it has become the accepted theory not only underlying the modern science of biology, but supporting as it were the system of the universe.

Philosophy would supplement and extend the inquiry.

In Darwin's hands, however, evolution was held with scientific fidelity to the facts of organic life. He produced and gave to the world, in his *Origin of Species*, a scheme of the evolutions and movements of life showing the tendency to variation and specialization of function upward from the generic pattern to complete individuality. As a matter of interest to the general reader, his

Darwin's method of illustrating results of natural selection.

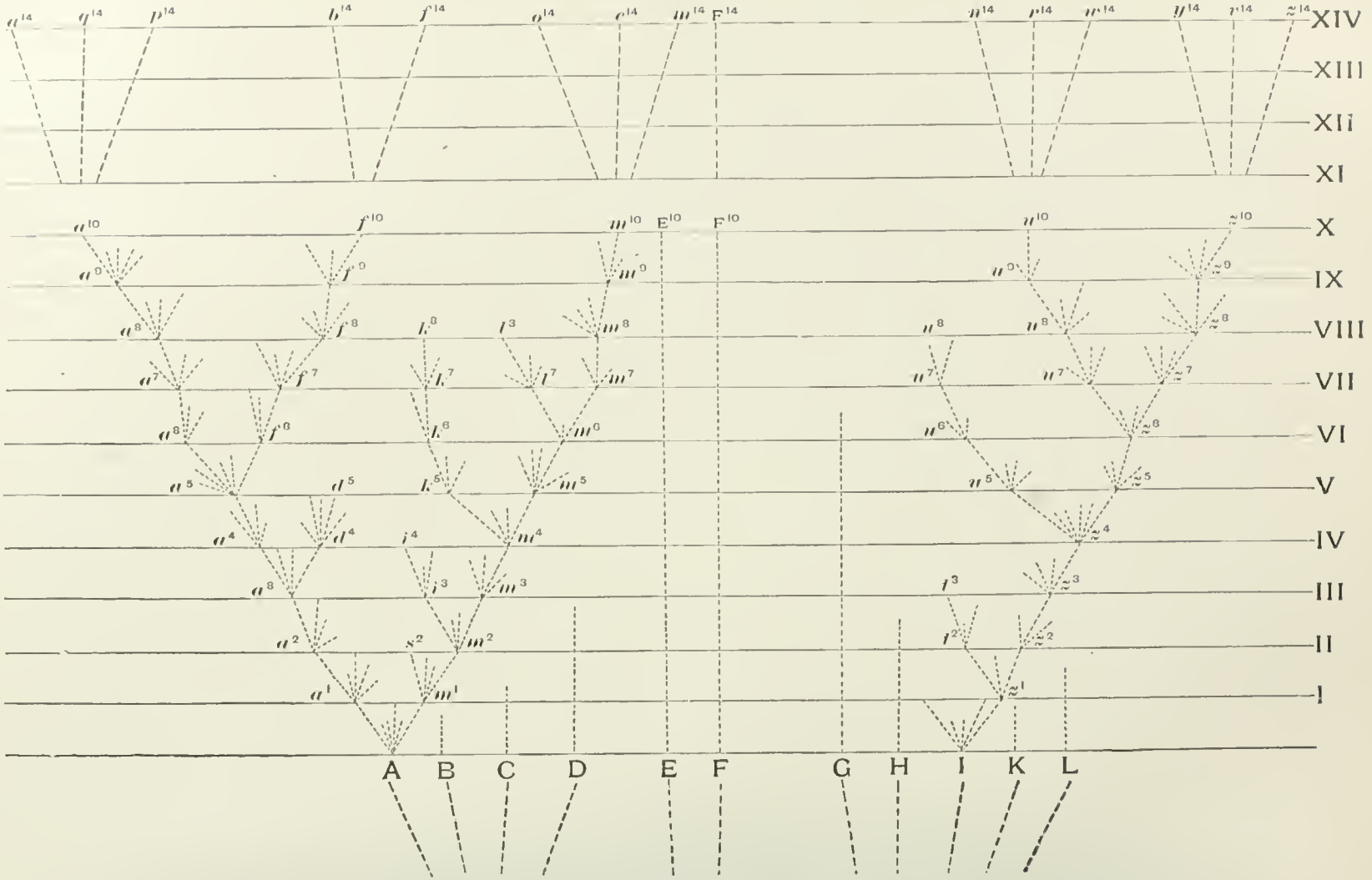


DIAGRAM SHOWING THE MANNER OF THE PRODUCTION OF SPECIES.
From Darwin's *Origin of Species.*

diagram is here repeated, together with a summary of the accompanying explanation. The letters A, B, C, D, E, etc., to L, represent the species arising from a single genus of living organisms. Some of these, as for instance A, represent a widely diffused and varying species. The dotted lines arising from A represent the varieties of offspring produced by the laws of natural selection. Some of these are preserved as a′ and m′, in the struggle of life, while others perish. When the variations have risen as far as the horizontal line I, they have become sufficiently marked and permanent to produce what is defined as a variety.

These two varieties, a′ and m′, are now exposed to the same conditions and vicissitudes as was the common type from which they sprang, and they in turn begin to vary upward in the direction of the dotted lines. Some of these tentative efforts perish and some survive, until another horizontal line, marked II, is reached, by which time the departure between them has been greatly augmented. So on upwards and upwards until at last, after thousands of generations, the horizon of X is reached, when the forms a^{10}, f^{10}, and m^{10} have become so widely differentiated as to constitute precisely identical facts in nature with those represented by A, B, C, etc., from which, under the name of *species*, the inquiry began; that is, varieties have become species.

It is not needed to enter here into the elucidation of the whole scheme, showing how in the struggle for life the evolution of varieties and species is now going on in the world of animated nature under the operation of laws which by fair inference are identical with those whereby the first species of living beings came into existence.

The first great principle, therefore, of the hypothesis of evolution, is that the life of any given species of living beings *is epitomized in the life of the individual* composing the constituent unit in that species or variety. The sketch of the life of the individual from its germinal state to complete development has already been given and need not here be repeated. The principle is that the same scheme of life is applicable to the species. The doctrine includes the hypothesis of a specific germ from which a given variety of animated beings has proceeded. Whether these germs of species were already variations from other antecedent forms which were ultimately derivable from *one* point of origin, or from *several* points, is a question too difficult and obscure for the science of the present century. But the theory is that the lines of all life whatsoever converge backwards toward a common point of departure from which all varieties and species have sprung by differentiation under the laws of natural selection and the conditions of environment.

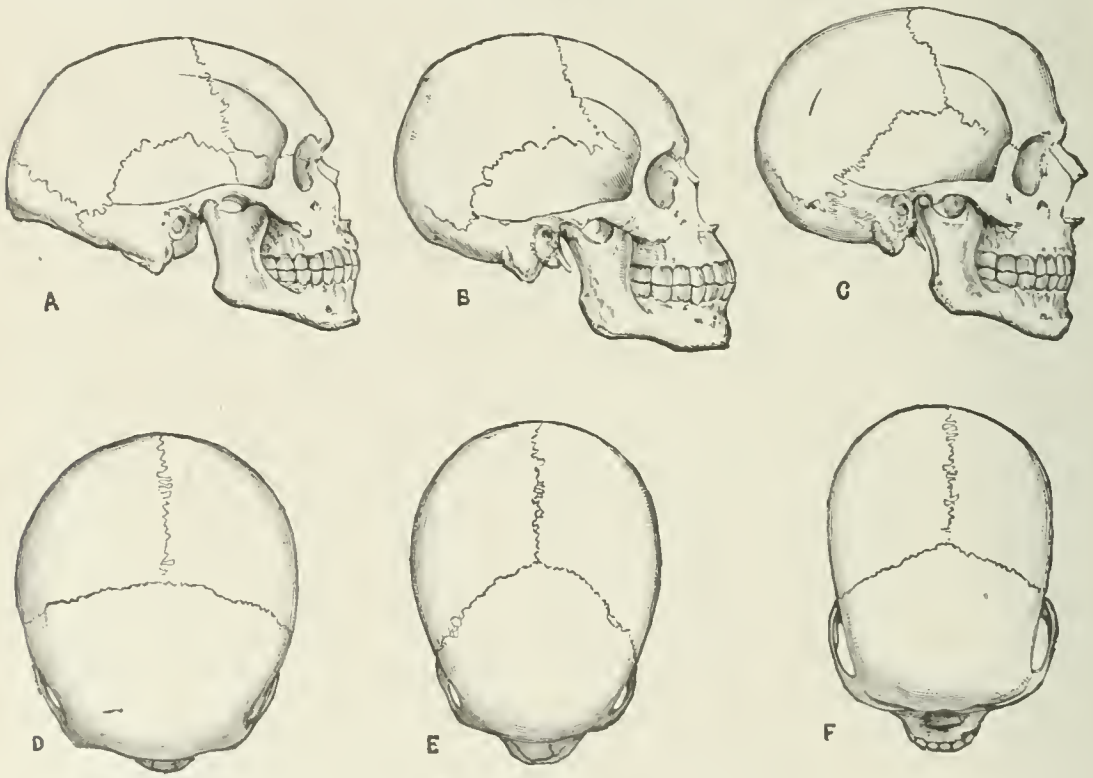
Life of the species epitomized in life of the individual.

These deductions of biological inquiry include the human race in the common scheme with the rest of animated nature. It is for this reason that we have to so considerable an extent enlarged upon the doctrine of evolution as explanatory of the beginning and development of man-life on the earth. The theme is so vast and furnishes so many suggestions of interesting inquiry that we may for a moment follow it to some of its most manifest conclusions and results. The life of man is at the very least *intimately associated* with the other forms of organic existence. The thread of humanity is interwoven—albeit a thread of gold—with the vast skein of animated nature.

The human race included as a subject in natural history.

and the human mind is so framed, and especially so disciplined in our age, as to find perpetual interest, if not delight, in the application of those general laws by which the race is bound in common destinies with the correlated forms of life.

In the first place, then, the theory of evolution teaches that man himself is the descendant, so far as his bodily organism is concerned, of a lower order of being. This ancestral form from which the human kind arose is not to be conceived of as an ape or any other existing creature, but only as man, with lower capacities and manner of life than are now possessed by the race. It must be remembered that the higher primates next to man are themselves as much the work of evolution as man himself. They, too, have been developed and specialized along their own lines of evolution. The departure, therefore, between any existing species of the anthropoid apes and the human species is great; not indeed so great as the fancies of many controversialists and some alleged biologists have depicted, but yet great. The chasm between the two, or the full measure of departure, has been produced by the divergence of each from the common type of an unknown ancestry.



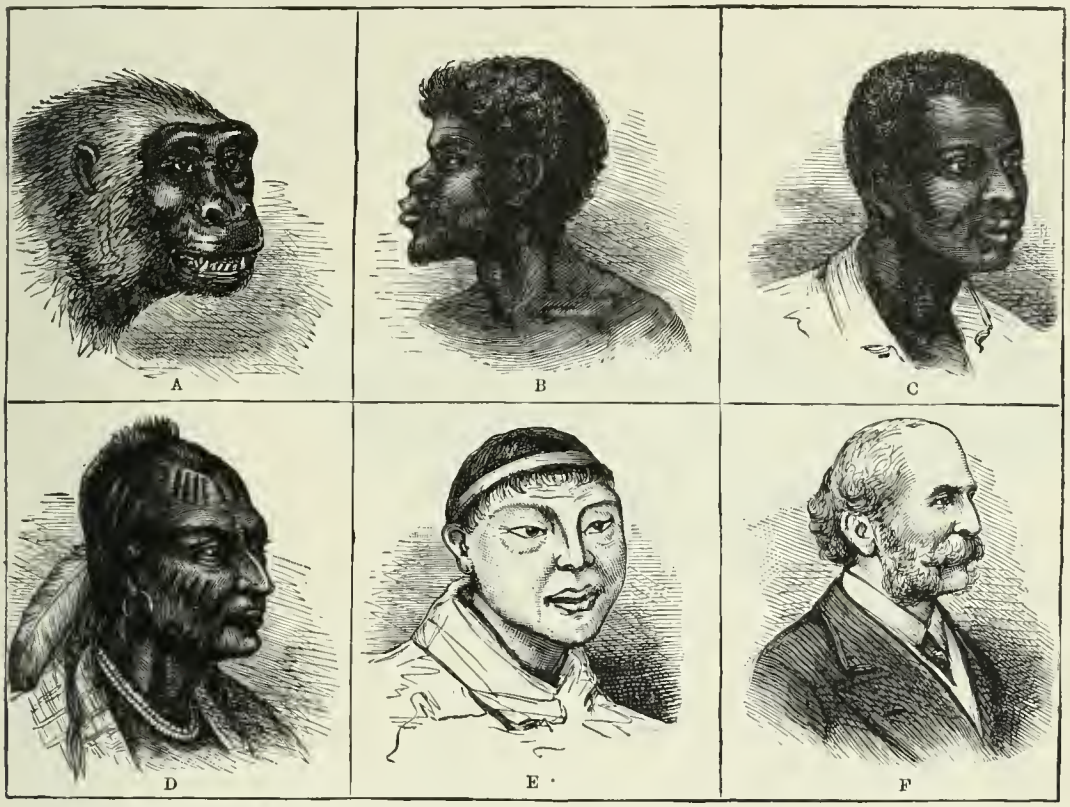
PROGRESSIVE DEVELOPMENT OF MAN.—(1) EVOLUTION ILLUSTRATED WITH SIX SKULLS IN ASCENDING ORDER.

What evolution teaches respecting the descent of man.

In the case of man the divergence from the common ancestral form has been ever in the manward direction, and in the case of the simian the divergence has with equal constancy been apeward in its course. Since the divergence of these two forms of life from the common type, there never could have been produced the one from the other. The ancestral form merely contained the po-

Every species is evolved from its own proper original.

tency of each. In like manner we may follow backward the ancestral line of the anthropoids until we find it converging with the line representing the lemuroids or the carnivores, or both. We thus see the lines of the higher animal life coming together at some point in the remote past, at which time the ancestry of all these forms existed in a common type from which divergence, first into varieties, then into species, and finally into genera, occurred under the long-continued influence of natural selection and its correlated differentiating forces.



PROGRESSIVE DEVELOPMENT OF MAN.—(2) EVOLUTION ILLUSTRATED WITH THE SIX CORRESPONDING LIVING FORMS.

The scheme of life may, under the deductions and principles of the general law of evolution, be followed still further into the illimitable depths of the past. We see not only by the light of conjecture and hypothesis, but by the actual and unmistakable indications of science the whole vertebrate kingdom of organic forms approximating at the last to a common type. This is to say that a single ancestry of a given but unknown form at one time contained the potency and elements of all the multifarious developments which have since taken place in the widely distributed and greatly divergent vertebrate animals of the earth and the waters. From this common form, through immeasurable lapses of time, the different varieties began to arise and to adjust themselves to their various environments in earth and air and sea.

Widening of the inquiry to embrace all vital phenomena.

Aye, more, the vertebrata and the invertebrata in the ultimate biological analysis approximate. The hint and suggestion are to the effect that these also arose from a common type; that the molusk, too, was included in a common

ancestry with the rest. But whether this latter deduction is warranted by the facts—whether all the genera and finally the orders of animated nature may be deduced from one common ancestral type—is still a hypothetical question, as is also the still larger and more remote problem of the derivation of all animal and vegetable life from a common stem. It may be, or it may not be, that the specific beginnings of the various kinds of organic life in the world were derived from independent originals, each endowed with its own inherent powers of evolutionary development; or, on the other hand, it may be that that converging tendency which is so plainly discoverable and demonstrable in the nearer field of view is universal and final, bringing at the last to one common original *all* forms whatsoever of living organism belonging to the present and past history of our globe!

Living species in analogy with the scheme of languages.

The problem in this particular is again in close analogy with that of the history of language. We know, for instance, that six of the great modern languages, inclusive of their slight dialectical developments, have all been derived from a common original under the influence of linguistic differentiation and adaptation to the thought, purpose, and vocal organs of the various peoples by whom these tongues are spoken. Time was when the potency of Italian, French, Provençal, Wallachian, Spanish, and Portuguese was all bound up in the Latin tongue of the classical ages. Thus much is historically and linguistically demonstrable beyond the adventure of denial or skepticism. Again it may be reasonably said that our knowledge is complete of the ultimate common derivation of all the Aryan tongues. It can not be doubted that Teutonic, Celtic, the Græco-Italic languages, the Iranic tongues, and Sanskrit are ultimately derivable from some common ancestral speech lost below the horizon of tradition and history. So also we know that Hebrew, Arabic, and the Aramaic languages are the descendants of a common original.

Best scientific belief points to a unity of origin for all.

At this point of the inquiry, however, we stand before the general problem just as the biologist does in his study of the origin of species and genera. Thus far the inquiries of each have led to the belief in a common origin for all the divergent forms which are the subjects of the investigation; but the linguist has not as yet been able to discover by philological inquiry a point of common departure for the Semitic and the Aryan languages. The tendency of the inquiry is wholly in the direction of a common linguistic original. But the student of language is obliged to supply by hypothesis the materials and laws of a study which he is able to pursue no further by the light of ascertained fact.

Probable derivation of all living forms from a few germs.

So also the biologist, though he find all species of a given order of animals approaching a common type in some prehistoric genus from which they all probably arose, is obliged to follow otherwise untraceable lines by analogy and hypothesis. Still more fully is he under the dominion of these conditions when he attempts the ultimate derivation of all living things from one common original germ and type of life. The tendency of inquiry is to that conclusion; but the biologist does not presume to say, as of definite knowledge, that all living forms whatsoever are from one original ancestral form. He proceeds no further than to say that the indications of the whole visible field of inquiry are in that direction, and that the scien-

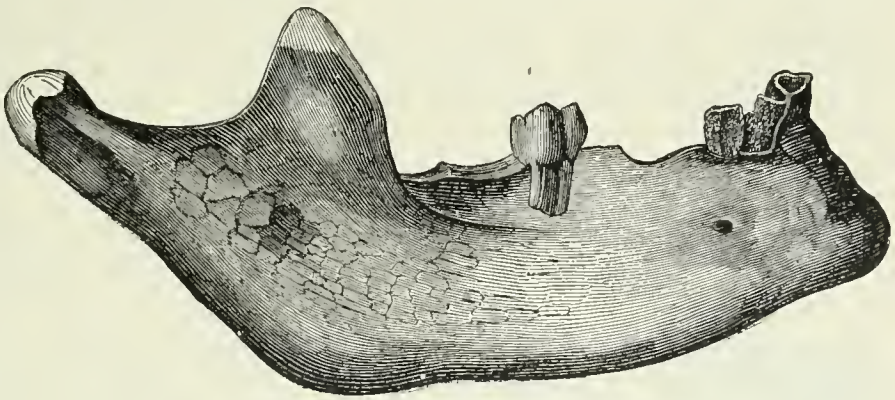
tific deductions which he is able to frame as if by parallax respecting the tendencies of life beyond the visible horizon *tend* to the same conclusion of a common original for all forms of organic being. Further than this, the applications of right reason to the ultimate problem are by hypothesis and conjecture; not, indeed, visionary and unreasoning conjecture, but such dim conjecture as a knowledge of the present and past history of life is able to afford.

We may thus in accordance with the theory of evolution contemplate a lowly ancestry for the human race. Exactly what kind of creature that may have been from which our species emanated on the organic side we may not know. At least in the present state of knowledge the ancestral type of our great and widely distributed humanity remains in the obscurity of dim conjecture. The hypothesis, however, is strictly agreeable to what we know from scientific data of the very first conditions and aspects of man-life on the earth. We are able to see by the light of scientific truth an ancestral type of mankind which, so far as we are able to discover, differed from the other higher primates in this, that the human creature was able to fashion a tool and to kindle a fire. These are the very first scientific indications of the presence of man-life on the earth, and they are strictly confirmatory of the belief of the emergence of the human kind from some lower form of ancestry approximate to the associated orders of the higher mammalia.

Theory indicates a lowly ancestry for mankind.

What is here said of the origin and descent of the human species may be repeated of all the other orders and varieties. The present work is not a biology. It is not the purpose in this connection to dwell unnecessarily upon the history and descent of the various kinds of animal and plant-life on the globe. Our work is essentially human, and only incidentally concerned about the correlated varieties of life. But so much of the question as possesses a human interest we are at liberty to follow. The particular study before us is the manner of the beginning of man-life on the earth, and the aim is to set forth without prejudice or unwarranted advocacy of either the two general and hitherto conflicting opinions with regard to the genesis of man.

Present inquiry looks to man and his evolution.



JAW BONE OF CAVE MAN, FOUND AT MOULIN BY BOUCHER DE PERTHES, 1863.—FROM THE ORIGINAL IN PARIS MUSEUM.

The one opinion is, as we have shown in a former part, the belief in an immediate and phenomenal creation of the specific originals of the various kinds of organic living beings on the earth. The other is the belief that the present as-

Restatement of the two views of human descent.

pects and forms of all things living have been produced by the operation of secondary laws, such as we now find efficient in the determination of other phenomena; that the several varieties and species of living organisms, including the human kind, have been evolved through great lapses of time from common ancestral types of a lower and simpler kind than those now existing in the descendent species; and that these lower and simpler forms were in turn derived from a few living cells, or possibly a single germinal origin in which were bound up all the possibilities and potencies of our living universe.

The question, as we have said and repeated and emphasized, is one of *modus operandi*. It is an issue relating wholly to the *manner* of creative processes. Time was when living beings did not exist in our sphere. Time is when they do exist. Therefore time was when they *began* to exist. The whole question is *how* and *in what manner* the living beings inhabiting the globe began their career and have been brought to their present aspects. The difference between the two opinions is one of time and condition and circumstance rather than a difference of fact. These unmistakable and unquestionable principles relative to the great inquiry before us can not be too clearly stated or too much dwelt upon if we would form an intelligent and dispassionate view of the history of life and of the diverse opinions regarding it.

The question reaches only to the modus operandi of life.

CHAPTER XIII.—APPLICATION OF THE DOCTRINE TO MAN AND NATURE.

UNDER the law of evolution we may proceed, in the next place, to account for the formation of the world. The earth is the habitat of man. Doubtless the other worlds are in like manner the arenas and vast fields of conscious and intelligent activity. The laws and processes by which a world—our own world in particular—is formed and brought to the stage of habitability must ever be a matter of prime interest to every reflective mind.

Our world the product of evolutionary processes.

The world *grew*. It did not spring into existence at once, but came to be through a long series of intermediate stages and gradual development. There was a time when the space now occupied by our solar system was doubtlessly filled by the sun and his concomitant gases. Such was the diffusion of matter, principally through the agency of high heat, that all was dispersed in a form of attenuated matter round and about the center of what was to constitute the sun of our system. From this point two great facts are to be considered, namely, cooling and condensation. With these two processes nuclei began to be formed in rings of matter at various distances from the center of the inchoate system of worlds.

Primeval condition and growth of the earth.

The position of our own orb was indicated in the first place by one of these semigaseous, semifluid rings of matter. In course of time—incalculable time—the ring condensed in one part and became attenuated in another. It then

broke and began to assume the globular form under the general laws which determine the shape of free matter in a fluid condition. Thus the process went on until the incipient globe became a plastic sphere, having a determinate orbit and drawing to itself the surrounding matter—a process which has not yet wholly ceased. Through long cycles of duration the formative work continued until the primeval world was fixed at last in its earliest geological conditions. What those conditions were the reader may discover by special study in that field of inquiry which relates to the formation of the earth's crust, the first appearance of life, and the orderly progress from the primordial to the present cosmic condition.

Prevalence of secondary laws in planetary formation.

All this has been a process of evolution. The planet has been formed by progressive intermediate stages, by the action of secondary laws whereby the former nebulous matter composing the earth was gradually transformed into that fixed, and we may say organic, condition in which we now find it. The long-accepted opinion about the phenomenal creation of our globe within a limited period of time has given place to that vast and orderly concept which contemplates the growth of all worlds from primordial matter up to a completed stage of development.

Animals and plants appear to have arisen by the same laws.

We thus see that not only the animals and plants which, as it were, possess the surface of the earth, the air, and the waters, but the globe itself has come into its present form out of the past eternity by the action of those forces which go under the general name of natural law. Or, if we turn in the other direction and begin to consider the results of intelligence in our sphere, we shall find that they also have followed analogous lines of development from a germinal to a completed and, as it were, organic being.

Linguistic growth the exact analogue of race evolution.

We have already seen how language, the product of reason, arising from the necessity of intercourse among intelligent beings, has presented in its history a complete evolutionary diagram. The history of human speech has been a history of ramifications and divergences. It is an astonishing fact that the biological diagram prepared by Darwin as the epitome and brief chronicle of all his study may be taken by the philologist and used to illustrate the spread and development of human speech without the alteration of a line! In it we have precisely the same phenomena which are everywhere repeated in the history of language. There is the same divergence from a simple radical into such varieties as in the case of language are called dialects; the same survival of some of these, that is, the stronger and better; the same extinction of other varieties; the same fixing of the better forms, and their development into special tongues.

Languages struggle for life, and the best survive.

Even among the existing languages of the world we find precisely the same struggle for life, the same natural selection on the lines of fitness and adaptation. The history of the English language from the times of King Alfred, a thousand years ago, to the present time presents a diagram precisely analogous in its relations to the other existing forms of speech as may be seen in any properly constructed scheme of biology.

The same is true of all those institutions of the human race which have reason, convenience, and interest as their original motives. One of the most strik-

ing and conspicuous of these is the institution of government. Who can fail to discover in the history of the governmental forms adopted by the human race the outlines of an evolutionary process? Of a certainty there was a time in the history of mankind when no government existed. Equally certain is it that at the present time one of the most conspicuous facts in the history of the race is the governmental form of society. There was, therefore, a time between these two extremes when government *began* to be. It was not created phenomenally and at a stroke out of nothing, but rather arose from an almost undiscoverable origin. There was a seed of government—a germ; then an embryo, and at length a birth. Then there was an infancy, a childhood, an adolescence, a tentative and adventurous youth; at last a maturity—if indeed the mature form of this institution has as yet been reached or even approximated.

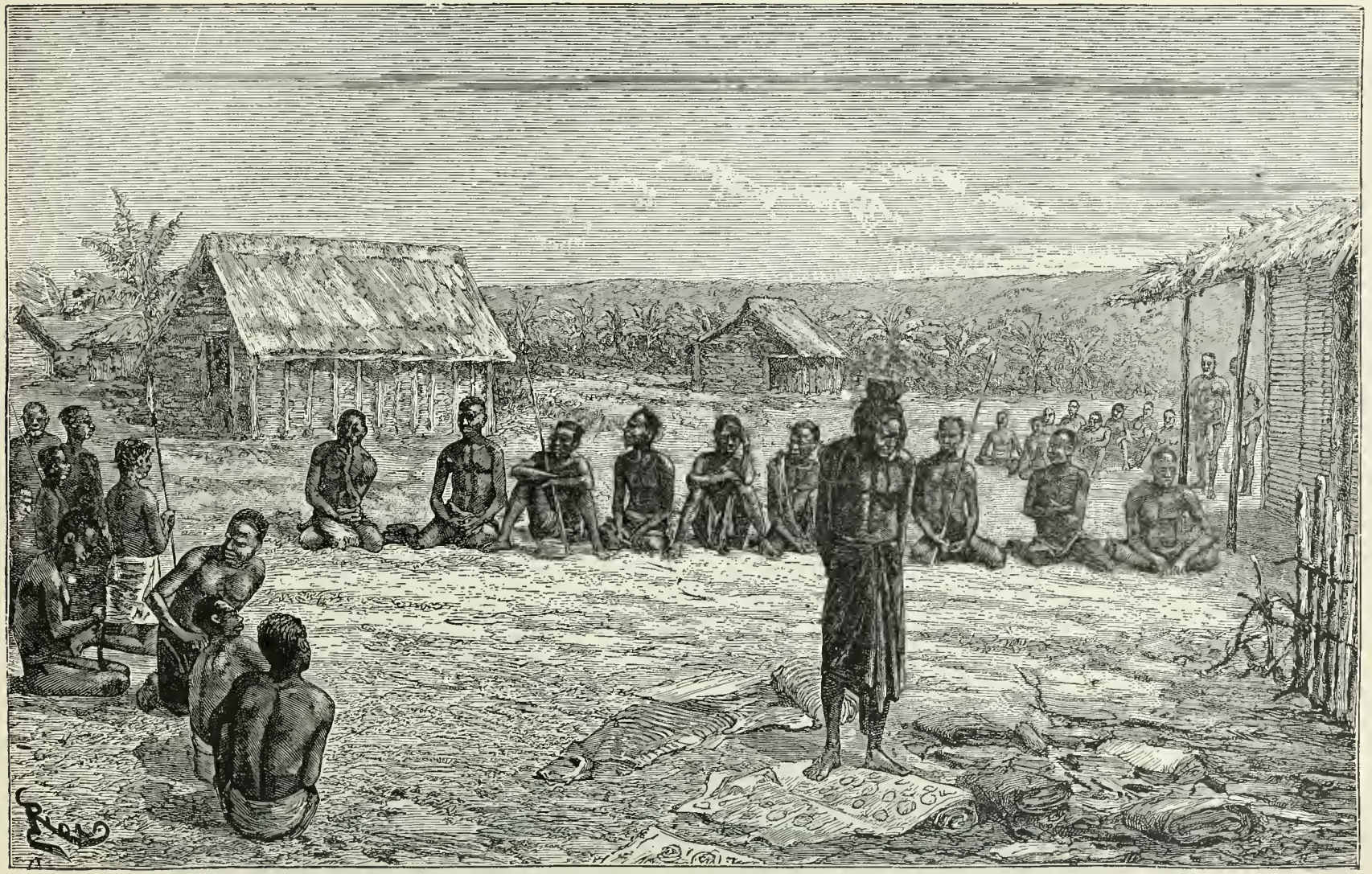
Human institutions arise in like order of growth.

In any event, the progress and *modus operandi* of governmental evolution are facts clearly discernible among the elements of human history. True, it requires a high grade of intelligence and no mean measure of information to enable the possessor to analyze and follow the process by which the governmental institutions of mankind have been evolved. We must, in the first place, discover the origin and point of departure—the time and the conditions—from which the institution of government has sprung. We must note some primitive tribe rising gradually into the conscious state and discovering the advantages which might be gained from such rudimentary civil organization as the leaders of the tribe were able to effect. The work would begin with tentative expedients. There would be in it an element of force, an element of reason, and an element of authority. The last named would doubtless arise from the fact of fatherhood. The fatherhood of the family, a purely natural fact, would extend to the fatherhood of the tribe, or clan, a partly artificial fact. Force would arise from the mere material consideration of strength. The strongest would begin to rule. The strongest man would in the first place compel the weaker to bear his burden, to draw his cart, to do service at the door of his hut. The strongest of the strong men would do the same for the whole village. The element of reason would doubtless spring from the action of several minds in conspiracy against the strongest. The strongest would have force on his side. The weaker would countervail by reason. It may not be far from the truth to suggest that the first check and counterpoise in rudimentary government is the balance of reason and force.

True nature of the evolution of government.

After government had once been instituted, in however crude a form, it would begin to adapt itself to conditions. There would be an adjustment of the governing fact with the fact governed, similar in all particulars to the adjustment of a living organism to its environment. Many tentative efforts would perish. A few would survive. Those surviving would constitute varieties. In Egypt one of the varieties will become a hierarchy. In the valleys of the Euphrates and Tigris another variety will become a colossal personal despotism. In one part of Greece a third will become an oligarchy, and in another part a fourth will take the form of a democracy. There will be a struggle for existence, a survival of the fittest. Sometimes the fittest will appear in the form

Governmental facts adjust themselves to environment.



GERMINAL GOVERNMENT ILLUSTRATED. HEADMEN OF TRIBE IN CONSULTATION.—Drawn by Riou, from a photograph.

of a military empire. This will break up in catastrophe, and a new order, half-chaotic, will supervene, in which the seeds of many things are present.

From this state ecclesiasticism will issue as one form, feudalism as another form, monarchy as a third. These in turn will struggle and be differentiated.

Stages and aspects in the development of government.

Some elements will perish wholly. Others will perish in part. Others will survive and flourish and bear unexpected results. The great fact called the People will appear as an intelligent force under the law of evolution. The people will itself endeavor to become governmental. It will struggle as a living force with monarchy and the expiring parts of feudalism. Out of the side of the people will spring by differentiation many distinct forces. One of them will be internationality; one will be communism.

So the struggle will go on, some for and some against the prevailing form.

Government in its progress obeys the law of variation.

The prevailing form will be promoted by some conditions and antagonized by others. It will shift and adapt itself somewhat to the forces which play upon it. It will, in a word, *vary* and take new forms and exercise new organs just as the individual varies, as the variety shifts, as the species assumes altered powers and fixes itself by adaptation and adjustment. The institution of government conforms, as language conforms, and as every kind of biological phenomenon conforms, to the one great law of evolution.

Take the case of that large fact called Law. We here refer to that aggregate of rules and principles which right reason discovers for the conduct of society. This also is what Lord Bacon might have called "a forthshowing instance" of the evolutionary process. Law is not made. This is to say that it is not produced by the wit and reflection of men. Rather is it a productive force bringing the intellects and reasons of men into such activity as may improve and formulate the best of the existing codes of conduct into still higher expressions of authority. Take for instance the law of Rome. Who shall declare its generation? Who shall find its germs? Certainly they existed before Rome was Rome. The makers of the Ten Tables did not produce the Roman law. They wrote on tablets what already existed. They would fix it in a form for posterity; but the transcript would not hold. The Ten Tables became Twelve. The code of the primitive republic would not suffice for the great republic, nor the code of the latter for the empire. Behold Justinian's lawyers working at the problem. They were only interpreters, not makers. They were striving not indeed to make new rules for human conduct, but to restate and summarize those which were still vital and operative. It was a part of their work to distinguish between the rules which still existed and those which had perished; between those forms, those varieties which had survived, and the others which had become extinct. Law as well as government, of which it constitutes one of the elementary forces, is itself an evolution—the residue of a conflict between the different principles of civil action, embodying the survival of whatever has been found best adapted to the exigencies of human society.

Law also an evolution; growth of the Roman statutes.

This society is itself, with all of its powers and capacities, an evolutionary product. Who created society? Certainly not man. It has grown with his growth, strengthened with his strength,

Society, like the plants and animals, grows and adapts itself.

and improved with his improvement. That society exists as a sort of framework and continent for the life of man and his activities is beyond denial. That there was a time in the past when it did not exist is certain. That there was therefore a time when the social germ appeared and began to present phenomena analogous to those of embryonic life can not be doubted. Henceforth the social evolution was in the likeness of growth as it is exhibited in the vegetable and animal worlds.

GERMINAL SOCIETY.—Home of African Chief Bembe.—Drawn by Madame Paule Crampel.

However intangible the general fact called society may be, it nevertheless has passed through successive stages of evolution identical with those which mark the progress of the individual and the species. Like the latter, the primordial form of society put out many branches. Some of these displayed superior vitality and power of adaptation. Others, being weaker and ill-adapted to conditions, perished. The better forms survived and took specific features which were perpetuated with accumulating forces to succeeding times. There was an evolution in the true sense of the word in every part of the problem, a natural selection, a survival of the fittest.

Perhaps the fundamental fact in the organization of society is the method by which the sexes are joined for the increase and preservation of the race. Marriage is one of the most primitive

Marriage the evolutionary result of social instincts.

and occult forms with which the historian and ethnologist has to deal. At the present time marriage is a vast fundamental institution upon which society is in a considerable measure founded. But this element of the social structure is itself an evolution. The law of its production is not well understood. The line in general appears to have proceeded, in remote prehistoric times, from the miscellaneous mating of the sexes to the present form of monogamy prevailing among the most enlightened peoples. The intermediate stages seem to have been first polyandry, and afterwards polygamy. This is to say that the social instinct first attempted an organic development by the line of the female. She was made the central fact, and the ethnic descent was drawn by way of her for the whole tribe.

Around the woman and on either hand were arranged the men of the tribe. Either of these might be the father of her offspring. The offspring thus had the tribe for its father and the woman for its mother. Nearly all the races have passed through this stage of evolution. A rude code of marital principles was formulated at a very early stage in the history of every inchoate nation. As late as the times of the Hebrew patriarchs the remnants of this code were still operative, for it was not only the privilege but the duty of the brothers to take the widow of one of their number deceased and to raise up children by her line.

With the mutation of things another principle of sexual union appeared and encroached on the first. This was polygamy, or an attempt to establish the line of descent wholly by the male. Here the man was made the central figure, and many women were associated with him for the multiplication of the tribe. The man was married to them all, or rather they to him. Their identity was lost in a single family stem having for its central principle the law of male descent. Thus the evolution proceeded to the establishment of monogamy, or single marriage. The affinity, or rather derivation, of the latter institution from polygamy is indicated by a certain predominance which the male still maintains in the organization of the family and the laws of descent. He it is who in general owns and controls the property. He it is who gives his name to the offspring. He it is who still constitutes the single line of descent from ancestor to posterity. The tendency in the present age to perpetuate the name of the woman in the offspring, and to establish in her line equal rights of inheritance and descent, are evidences that the law of variation and adaptation is still operative in determining the methods by which the family shall be constituted and its benefits conserved.

Successive stages in the development of sexual union.

The law of evolution works also effectively in determining the products of the human mind. All of the arts have proceeded from this common source. Observe with care the exact correlation existing between the development of the plastic art and the general evolution of the civilized life of man. The growth of this species of artistic achievement may be completely illustrated in the history of a single human life. Note with care the first attempts of the child, close to the borders of infancy, to create the representative forms of animals and birds. The instinct is as natural as the bodily functions, such as breathing and the use of the senses. The child reproduces in clay or dough the form of his dog or cat. It is the infancy of art. We may see it far away among the

Artistic products of the mind arise by evolution.

broken pottery of Cush, or among the rubbish of the silver-bright halls of the Peruvian Incas. Note well the character of those rude figures on earthen vessels, those half-formed effigies of reptiles and birds and beasts and men and deities which the primitive races, in far apart quarters of the world, produced in the prehistoric ages. What are they but the works of the infancy of the race? What are they but the ancient ethnical prototypes of what is every day repeated by the children of the civilized life as with laughter and quaint conceit they build up in mud or dough the images of their fancy and set them in array in the goodly child-museum of the world?

But children soon arise from this level of infancy. They in whom the artistic instincts are strongest continue in more skillful ways to reproduce with model and plaster the objects of the ideal sense. There is thus in the individual life a youth of art, and after that an early manhood. Still later there is maturity, and at length the silent and august chambers of some great collection speak and coruscate with the splendors of achievement.

Precisely so in the progress of the race. There too was there a youth of artistic development risi slowly from the quaintness, absurdity, and grotesque outlines of the works of childhood. There too was there an evolution into the higher form. There too at last the survival of the fittest gave to the world an artistic age and an artistic people. What is true of plastic art is true also of the art of the brush and of all other arts soever. They have grown from germinal conditions. They have sprung not at once and phenomenally into full-blown proportions of truth and beauty, but have come to such state through long intermediate stages and the torturous processes of natural selection.

Childhood of art succeeded by youth and maturity.

So also of the correlated forms of literature. This, even as art, has a lineage as remote, an ancestry as olden, as the beginnings of human consciousness. The first slight excursion of human thought and its corresponding expression in some rude and half-ejaculatory form of speech marked the origin of all things possible in the subsequent ages of literary development. It is only in the present time that a true concept has been gained of the far-reaching lines of force which precede the delivery of every single literary product. A great poem or a great history has gathered up in it much of the vitality and reproductive energies of the preceding ages.

Literature, also, appears by growth and survival of the best.

In a larger sense, each literary epoch is the product of an intellectual evolution which has been going on through centuries of time. The men of letters in a given age are only the abstracts and summaries of mental forces which were operative long before their birth. Moreover, the actual literature of any given epoch is but the better residue of a vast mental waste which has perished in oblivion. Could all the efforts of the mind to perpetuate its activities in the form of letters be recorded in a diagram, the student of that mental picture would be confounded with an alternate rush of admiration and of tears—admiration for the infinite outreachings of human thought, its upward struggle for expression in the realm of song and story, and tears for the incalculable waste and decay and death of intellectual endeavor.

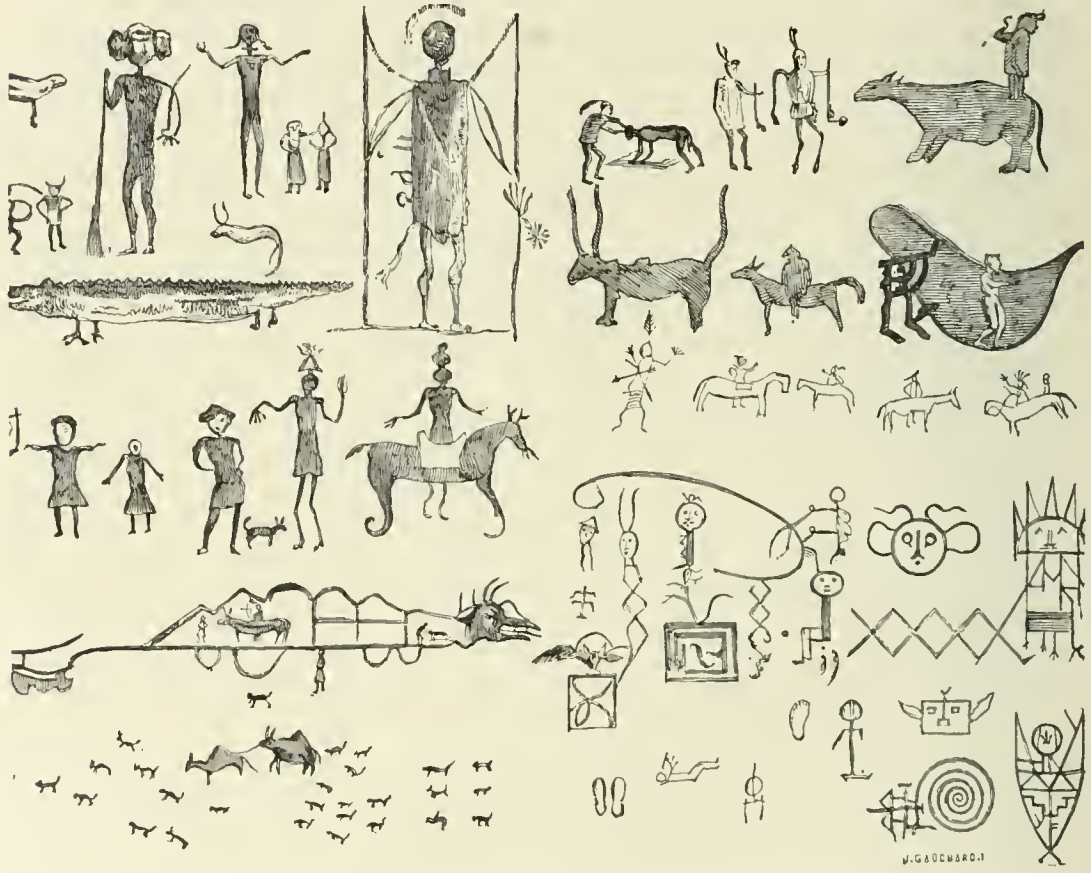
Each national literature is in like manner the product of an evolutionary process. It does not appear at once and phenomenally as a dream-born blossom on a dream-planted tree. It comes rather

after long ages of intellectual growth and adaptation. True it is that history has left but little record or hint of the centuries which precede the coming of letters; for history is dependent on literary expression for all or nearly all that she has been able to save from the wreck and desolation of time. But we know that the preceding ages of darkness and barbaric struggle did exist, and that letters came afterwards as the bloom and fruit of a tree which had been nurtured through many vicissitudes by the cruel but skillful hand of natural selection.

Literary product of each race has its own evolution

In the history of letters we find the same divergence from a common ancestral type, the same establishment of variation and species, the same accumulation of traits and transmission of qualities from age to age as are discovered in the history of organic life. The outline of the evolution of any particular species of literary composition, as for instance of the drama, is identical in its principal features with the diagram which represents the life-story of the vegetable and animal worlds or the growth and diffusion of languages.

Law of divergence and survival holds in letters as in life.



EVOLUTION OF WRITING.—Hieroglyphics Found in Cavern of Rocky Dell.

In this progressive examination of human products we rise at length to history itself. The term is used in two great senses. The first includes the affairs of men; the events of which men have been the creators or at least the factors; the aspects and conditions which human

Two meanings of the term history.

life has assumed in the successive ages since the rise of mankind into the conscious state and the civilizing purpose; and finally, the causes and concomitants of this progress, the general trend and bearing of humanity in its course, and the results and probable destiny of the whole. The other sense in which the word history is used is the literary transcript of the manifold human phenomena just described. History is either the event or the account of the event, the thing done or the narrative thereof, the drama of the great arena as it is actually enacted or the written and as it were pictorial representation of the antecedents, aspects, and denouement of the struggle. Of course, the important history is the real history; that is, it is the event itself—the event with its causes, conditions, and results.

THE FIRST HISTORIANS.
Drawn by Emile Bayard.

The career of the human race from the beginning until now is the one supreme and essential history of which all the rest are but fragments and reflections. But in whatever sense we may consider the subject we shall find that this sublime result of human agency, this combina-

tion and concord as it were of reason and eternity which goes by the name of history, is itself the result of an evolutionary process. This is not said of the primal force with which all human things began. Here, as in the case of the origin of life, we are obliged to presuppose something antecedent to the beginning of the organic form. Time was when there was no history. Time is when history is the one great fact of the world. Time was, therefore, when history *began*. This is to say that there was an origin of events, a germ of potency out of which they sprang. The affairs of men out of such original point of departure have arisen like living organisms by differentiation and the struggle for life. What is an event but a survival? How many events have perished in the inchoate condition! What a prodigious, almost infinite, waste there has been of human life and endeavor in the work of discovering the fittest thing! How much despair and hardship and endless rebuff and suffering have attested by the criterion of failure the miscarriage and extinction of the fruitless stems of human purpose and ambition!

Events in all their forms obey the evolutionary law.

The real historical diagram, could the same be drawn in pictorial form, appreciable to the sense of sight as it is dimly appreciable to the understanding, would be but another example of the biological tree. Here at the beginning we should have a single line of departure containing the whole potency of the human endeavor. A little further on, the phenomena of variation and divergence would appear. Certain forms of human conduct would take outline corresponding to the varieties of living organisms; but these forms would mostly perish. Only a single form here and there would survive and rise and expand into a higher development.

Likeness of historical diagram to the biological tree.

For a long time these growing and diverging lines representative of the progress of the race would wind and struggle through the darkness and oppositions of the prehistoric ages. At last a few lines stronger than the rest fitter than the rest, would rise as in itial forms of national life above the horizon of recorded annals. One people would depart from another. One career stronger than the next would push it aside, overgrow it, supplant it. Some events would expand and enfold others, rise into new aspects, bear on to more conspicuous results. Nations would emerge into the open field of primitive history. They themselves would begin to struggle just as other species of living entities contest for place and perpetuity. Many under pressure of adverse environment and the competition of the stronger would dwindle to extinction. Others, by reason of strength and favorable situation, would as it were make for themselves nutriment out of the death and decay of the lesser sort, and thus rise to gigantic stature.

Particular aspects of the growth of history.

The historical vine creeps westward from the Euphrates to the Tiber. Nations and peoples are but the outbranchings of a common life. The Chaldees and the Assyrians are correlative arms thrust out left and right from the trunk which carried along the potency of the nations of Asia Minor. There is a Græco-Italic divergence from a stock which we call Aryan, and history begins to babble of Dorians, Æolians, and Ionians; further on, in clearer language, of Spartans, Athenians, and Macedonians. What is it all but the evolution of the historical life of peoples under the one common

Races and nations are the product of the human vine.

law which pervades alike the world of matter and the world of consciousness and reason?

Look at the environment. After the river valley the peninsula is more favorable, as the scene of historical evolution, than is the island or the continent. It has the advantages of soil and stream and forest growth and the proximity of the sea. Generally the peninsula is favored in mineral deposits. When tribes drift into such a locality they begin to flourish, grow strong. Further on they multiply and conquer. Society becomes organic. Law exists. Government is instituted. One such locality is Greece; another is Italy; another is the Iberian peninsula. The Celtic life develops best in the projecting parts of Western Europe. Britain itself is as much peninsular as insular. Denmark is a peninsula; so also Sweden and Norway. Aforetime Indian civilization was developed in the peninsula between the bay of Bengal and the Arabian sea. Environment aids the diverging forces of the human race in the struggle for existence. The peoples thus promoted rise to historical importance, and the rest fail through impotency of ethnic energy or by conquest of the stronger.

Peninsula succeeds river valley as the habitat of man.

PROGRESS FROM INSTINCT TO REASON.—The First Potters.—Drawn by Emile Bayard.

To pursue the subject along the lines of its multifarious suggestions would be to fill a volume with illustrations of the one prevailing law. Human thought itself is an exemplification of the evolu-

Thought itself conforms to the evolutionary process.

tionary principle at work among the very highest forces of organic life. This is not to say that thought is the product of material energies, but only to offer an explanation of the modes of its operation and the processes in virtue of which its efficiency is attained and manifested. Here again the same formula applies. Time was when the ancestral fire-kindling, tool-shaping, pot-making progenitor of human kind can hardly be said to have thought at all. Time is when men think to the uttermost. The excursion of the intellectual powers is to all heights and depths. The borders of the universe are reached on airy wing. The empyrean is scaled as though it were but the dome of a cathedral. The profound abyss is fathomed. All worlds are traversed and all space explored with the steady and unerring flight of thought. Mystery is no mystery under its analysis. The unknown recedes before it and hides behind the outer curtains of infinitude.

But it was not so in the beginning of man-life as the same is revealed in its primordial condition by the explorations of science. Then the dreamless, visionless, and unaspiring creature containing within himself the potency of Hindu, Parsee, and Greek; of Roman, Gaul, and Saxon; of Mohammedan, Jew, and Catholic; of Frenchman, Briton, and American, thought not at all, or thought only in such sort as is common to the higher orders of speechless animals. Therefore the time came when men *began* to think. There was an origin of the excursive and reflective powers of mind. Not at once and in a marvelous manner did man become the animal that thinks. Not in a day did he become a seer, a poet, a philosopher. Not in a single age did he begin by his knowledge of things, his apprehension of the laws of causation and consequence, to rise to power and greatness in the arena of the world. Thought itself, the power to think, began to grow by differentiation, by struggle, by resistance, by success, by adaptation to condition and the survival of what was best.

Reflection and reason spring by growth from sense and instinct.

The human mind, with all of its sublime powers and capacities, is a residue, a descendant, a survival. We touch here upon the close correlation between mind and organism. The manifestation of mind is by means of organic structure. So far as our present state is concerned we discover it only in connection with brain. So much brain, so much manifestation of intelligence, is the rule throughout animated nature. Men are graded up or graded down in the scale of being accordingly as they do or do not possess a highly organized nervous system and a heavy brain. The distance from the lowest to the highest is the distance from the brain of the Bushman to the brain of Cuvier. This is said of the *manifestation* of intelligence. How much hidden and unrevealed power there may be in man it is not our province to determine, but rather to note the forthshowing of his intellect and will and purpose in correlation with organic structure.

The present human mind a survival of the ages.

We have seen above how organism fits and adapts itself to environment; how it flourishes under some conditions and languishes under others. So also of the mind. The intellect has its environment. It varies and takes new forms of activity according to the conditions under which it is placed. The best forms of intellect survive, and the poorer forms become extinct. Mind is differentiated into varieties and species. There was aforetime the mythological mind of antiquity. Closely allied to this

Intellect varies according to environment and habit.

was the mirthful and artistic mind, such as we note in the case of the Greeks. Afterwards there was the mind of order, oppression, and authority. There have been ages in which the credulous and superstitious mind was the prevalent type, and other ages in which cruelty and animality were the prevailing mental characteristics of peoples and races. There have been periods of speculative activity, and last of all an age of scientific acquaintance with the phenomena and laws of the natural world.

Thus the mind has not only its individual peculiarities and dispositions, but also its varieties, its species, its genera. Like the bodily organism, the intellect has had to struggle with opposing forces, with the shadows of doubt and darkness, the trackless wilds of uncertainty and error, the battles of contingency and fact, with powers and dominions and systems, the wreckage of the past, and the visionary outlines of the future. Hope has supplied one motive and fear another. Happiness and hunger, suffering and ambition, the satiety of things present and the longing for things unseen, mystery, passion, dream-born phantom, syllogistic formula and life and death—all these have contributed to give to the mind not only its moods and current phases of activity, but also its permanent fashion, its fixed hereditary character, its outline, and even its pictorial details as the same are reflected on the magical screen of the world's literature and art.

Mind struggles with conflicting forces and is developed.

We come thus to the border land of the moral nature of man. Such a nature exists within him. In different races and peoples it has a varying degree of development. There are tribes, such as those of Central Africa and they whom Herndon discovered in the upper valleys of the Amazon, in whom the moral nature is scarcely more than a possibility. There are races in which this high sense is dominant over all the other human powers. The evolution of conscience has varied according to the endless fluctuation of conditions and circumstances. Among the lower raees the moral nature gives but an uncertain sound. Its voice is but as the voice of the rain-maker, the conjurer, the snake-charmer, the medicine man of the savage state. With the higher peoples the moral harp is attuned to nobler harmonies. By these the laws of right and wrong have been discovered. Here the difference between turpitude and justice, between innocence and virtue, between crime and righteousness has been found and measured by a standard.

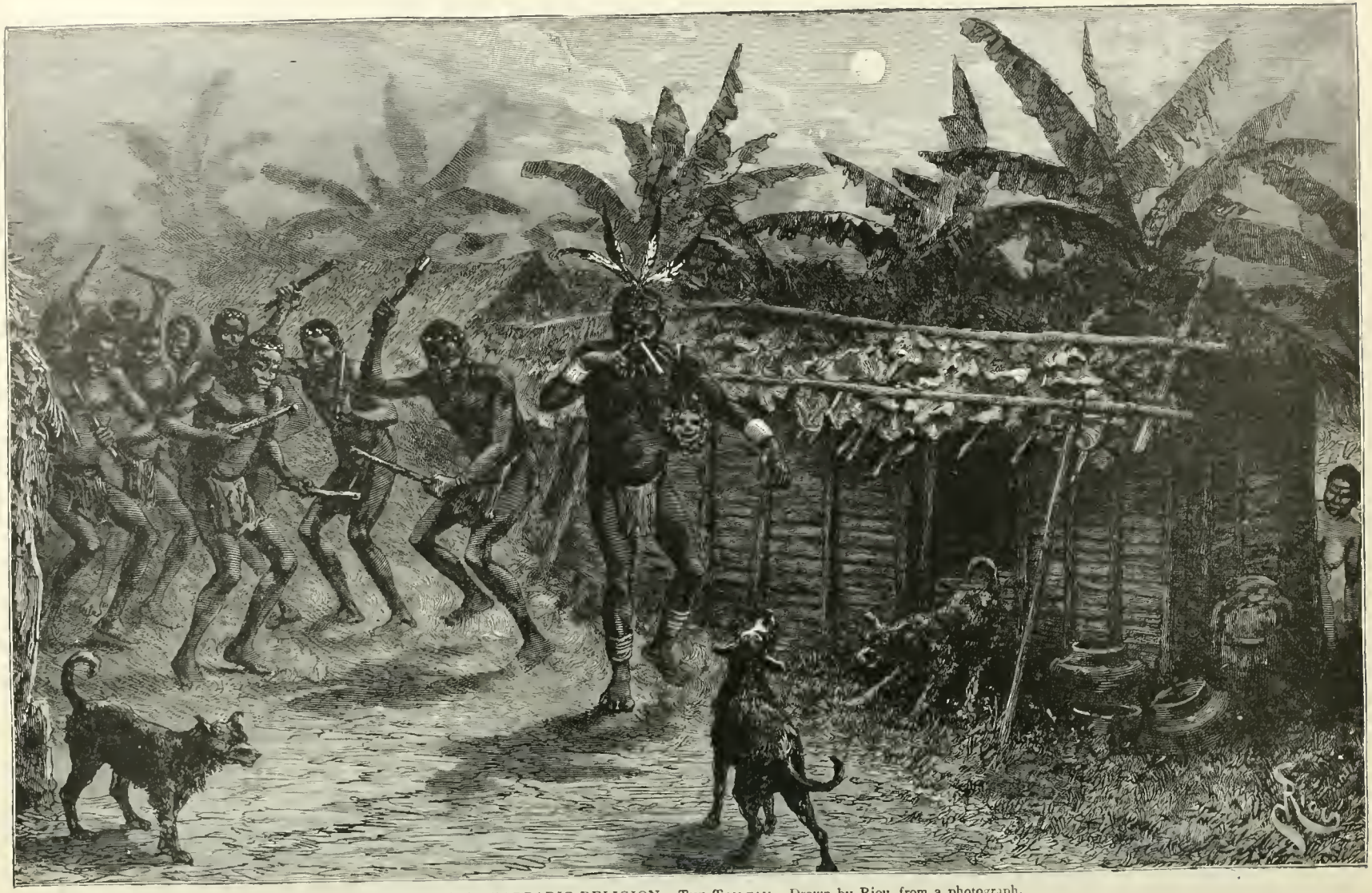
The moral nature obeys the law of fitness and survival.

But how long and painful has been the confliet through which the moral nature of man has passed in its development! The evolution includes every variety of hardship and trial. Who can number the systems and codes of morality which have marked the various stages of human progress from savagery to civilization? As the condition has been, so has been the moral standard. Just as a given people has been evolved out of the barbarous condition, just as it has succeeded in reaching a higher and more salubrious plane of activity, just in that degree has the moral code unfolded into a newer and better life.

Religions are evolved coïncidently with the races.

Conscience has, on the whole, been correlated with the other elements of civilization. Rectitude as a principle of human conduct has come with the emergence from the savage state. Justice has been established in proportion to the advancement of the other elements of the

Conscience and virtue the residue of struggle and adaptation.



BEGINNING OF BARBARIC RELIGION.—The Tam-tam.—Drawn by Riou, from a photograph.

higher life of man. Honor and truth have been regarded according to the varying stages of physical and intellectual progress with which these ennobling qualities have been connected in time and dependency. There has been in the domain of the moral life, in the history of the moral nature of mankind, the same struggle and warfare, the same differentiation from common types and standards, the same phenomena of variation into specific forms as we discover among the living organisms of the natural world and in the purely intellectual progress of the race.

Finally, man himself considered as an entity—viewed not from the side of his organic being but more largely as a living, conscious agent, chief among the creatures inhabiting this visible sphere of activity—is a residue, a result, an evolution. This is said of man considered as a whole and apart from his particular faculties and modes of action. Under the old anthropomorphic system of belief it was natural, inevitable, that man should be regarded chiefly in his causative character. He was viewed as a cause—as an originator of forces and the creator of things. Such a judgment of his relations to the world in which he is appointed to act his part was natural, almost necessary, as the first opinion of human beings respecting themselves. Each viewed the other as an active producing agent. Each saw, or seemed to see, the affair, the event, arising from the human hand and will. It was natural to conclude that all the visible conditions of life were the results of the productive energies of men. They were causes, and all things else were the effects of their causation.

Man himself a resultant; anthropomorphism passes away.

The man was thus placed first, and civilization afterwards. Cities and states and kingdoms were made by men. Art and letters were produced by men. Great contests in the senate house and greater battles in the field were fought by men. Pyramids and temples and sculptured monuments were done by men. Imperial dominion was achieved by man. His were the ship and the poem, the catapult and the aqueduct, the paradise and the pantheon.

Relations of man the individual to progress and civilization.

It is only in recent times that a larger view of the principles of universal causation has been obtained. The understanding has at length taken precedence of mere sense, and man is seen in a different relation with the world which he inhabits. He is himself seen as a result of antecedents. Not that his power of causation is wholly taken away. Not that he is, under philosophical scrutiny, unable to influence the conditions under which he lives. Not that he may not deflect somewhat the lines of force which pass through him or by his side. But, on the whole, he has ceased to be regarded as the cause of the things that are and have been. He himself is rather the result of forces that were operative long before the beginning of his conscious existence.

These forces have conspired and cooperated to make man what he is. This is not to say that within the limits of his own consciousness he is not himself; not to say that he is deprived of spontaneity; not to say that his faculties are under control of a fatality above himself; not to say that his own direction through the intellectual and moral sphere is not determinable by a will and purpose of his own; but rather that the man is, in a general sense, the product of the age, the child of a larger destiny, the offspring of a paternity whose line of

Spontaneity of man not denied in new concept of his nature.

descent is old as the birth of the human race.

These principles are true of the man as an individual. He is, on the whole, what he is by the conditions of birth, ancestry, association, discipline, and opportunity. No man can change his race. He is not consulted as to the ethnic family to which he will belong. He is not influential in determining the name and classification of his kindred. He is thrust into the world with as little power over his origin and over the particular conditions which shall determine his place and opportunity of survival as though he were the product of a seed transported across continents and seas and planted in strange regions. Here is the Esquimau in his hut, and yonder the native Australian sheltered by his half-formed tent. One is born in a palace, another in a hovel. One is taken to the bosom of a Turkish mother as she lies reclining on the rugs of a harem at Ispahan. Another is caught up and borne away by the swinging camel across the limitless desert. A third beholds the light from the heart of the roaring metropolis of the British nation, and a fourth begins to be in a cabin on the skirts of the clearing, where the corn is planted, and the robin builds her spring nest in the ash tree.

The individual bound from birth with fixed limitations.

The after conditions of life are determined *for* the individual rather than made *by* him. It is said that great warriors are born; but none are born in other than a warlike age! The poet also is said to be born, not made; but if the epoch do not favor, what then? If the antecedent forces have not conspired to produce him, what then? If the materials of great song have not been supplied by his race and times and language, what then? If his physical organism should fail—if malignant disease should invade or vice pervert the nature within him, what then? The orator, also, and the statesman, the philosopher and the man of letters, are each and all indebted to the combination of the forces of heredity with the forces of environment, to the temper of the age, and even to the opportunity of a great event, for the development of their powers and their intellectual mastery of the epoch in which they flourish.

Genius is born, but fashioned by environment.

As already intimated, it is not intended to press unduly and beyond the limits of demonstrable proof the argument for the production and shaping of the life of man by the operation of secondary causes. But that he is in large measure a result of conditions, a product of forces antecedent and superior to himself, is a proposition too plain and too well established by indubitable facts to be confuted. What is true of the individual is true in a larger sense of his kind. The different families of men, the races, the *species*—if so we call them—have in like manner come to be what they are by the action of extraneous forces; that is, by the coäction of extraneous forces with the inherent forces of life and growth.

As comes the man so also comes the species by growth.

Of a certainty a given variety of men can not be made exclusively by environment. A type can not be produced simply with a mold; albeit, there must be something to be cast into the mold! In every adaptation there is an extraneous state, condition, or fact, and another fact or force brought into contact and fitness therewith. It were too much to say that the Esquimaux are the product of the arctic regions; that the Turanians are the progeny of the Asiatic steppes; that the supple Malay is the

Environment not all in the production of human kind.

offspring of the cocoa-groves and soft, warm air of Java; that the Patagonian is the product of the peculiar climate and country of his nativity. But it is true that all of these forms of human kind are typically what they are by the influence of the mold into which they were cast by ethnic distribution and by the forces which have played upon them in the long processes of tribal and national development.

Man a resultant of ethnic heredity and environment.

All men are men; but the deflection from the common type is very great. The departure in any given case from the original pattern must be measured as a resultant from the combined forces of ethnic heredity and environment. The cranium of a Flathead Indian is still a human head, however much it has been made to depart from the normal type by pressure. Among savages many of the bodily organs have been distorted almost out of semblance to the normal parts which they represent; and yet they are essentially the same. Environment and special conditions have produced the abnormality, but nature gave the material of the product.

Races differentiated by natural preference and appetency.

The differentiation of the races of men has been effected along certain lines of national preference and appetency. The Aryan peoples have been the explorers of nature; the discoverers of causes. They have been the adventurers and conquerors of mankind. They have been the makers of the myth, the fable, and the song. Further on in the evolution they have been the wielders of great forces, the inventors of prodigies, the subduers of the natural world. From all this the Semitic line of departure is clearly drawn. To the Semites belonged the discovery of ancient religions, the recognition of almightiness behind the cloud and shroud of nature, the formulation of systems of belief and ceremony. Later on we discover in the descendants of these the skill to gather—as quicksilver gathers—gold among the débris of the nations. The Hamites were the builders of the ancient world. Behold the pyramids, the tombs, and palaces of Egypt and Chaldæa!

Extent to which the various races are specialized.

Among modern peoples the law of specialization has worked out still more wonderful results. The different races are specialized, almost as so many organs, in one huge body, each having its function in the universal whole of the varied life of man. These divergences in powers, capacities, aptitudes, and accomplishments have been produced by the same law of variation which holds good in the domain of animated nature. The Greeks were the merchants of the classical ages, as the Tyrians and Sidonians had been before them. Observe in this fact the operation of two forces: ethnic energy and commercial situation. There was an adaptation of the race to the place—of the people to the opportunity.

Differentiation of the English-speaking peoples considered.

So in the case of Great Britain. The English-speaking race has gone forth into many situations. The ethnic force is sufficient to account for the adventure, and adaptation to account for the results. The great problem of English civilization—the problem of holding in one imperial structure of society all divisions of the multiplied millions who speak the language of Alfred and Chaucer—is complicated to the last degree by the fact that the commercial and seafaring and warlike character which was so strongly impressed upon the original people has been specialized under the law of environment and circumstance

into many wide-apart and diverse national characteristics. One of these English tribes holds Australia; another, seventy millions strong, occupies North America; another division, in rapid process of specialization, dominates and will at length populate Hindustan. They are surviving branches of a single ethnic tree.

There have thus arisen *varieties* or *species* of Englishmen. Specialization has done its work until the original British type is with difficulty discovered in the lumberman of Ontario, the miner of the Colorado cañon, the ranchman of the Llano Estacado, the sheep-raiser of New South Wales, and the opium merchant of Allahabad. In all parts the law of differentiation and growth, with the survival of the best forms and the extinction of the weaker, has prevailed, until the races of mankind have become specialized at the extremes of the human distribution, even as the organs of a living body have been brought into existence and efficiency by their uses and adaptations.

CHAPTER XIV.—OBJECTIONS CONSIDERED.

WE have thus pursued the theory of evolution to the full limits of fitness in a work such as the present. We have viewed it as the *modus operandi* of universal nature and of man. We have seen it exemplified, first of all, in the laws and processes of individual growth, whereby each living organism in the great kingdom of life has been brought by struggle, fitness, and survival, by differentiation, growth, and exercise into the mature and perfected form. From this starting point in the career of the individual we have extended the study to varieties and species of living beings.

Summary of deductions to the present stage of the inquiry.

We have observed among these the same principle of divergence, development, and adaptation as were found to govern the course of the individual organism from the germ to the perfection of its powers. We have considered the same law as illustrated in the growth of the world and our associated planets from a common solar mass of attenuated matter. Further on we have applied the theory to the products of human intelligence, such as language, institutions, and laws. We have seen that these also spring out of primordial conditions; that they diverge and struggle, survive by fitness or perish by incongruity with conditions and circumstances.

We have noted, in the next place, how the law holds also in a wider and higher sense of the human mind itself and of the moral nature of man; and, last of all, we have observed the application of evolution to man himself. We have considered him as a living entity working his way through a thousand tentative efforts to the maturity of his powers. We have seen that in general the different forms of human life, as exhibited in races and kindreds—springing, as they did spring, from a common human type—have conformed in their movements and methods of development to the same principles which seem to prevail throughout the whole world of organic life, and indeed in universal nature. It now remains to note some of the objections which have been suggest-

ed, some of the reasons which have been urged, for the rejection of the theory of evolution considered as an explanation of the phenomena of life.

In the first place, it is said as a ground of disbelief in the hypothesis of evolution that it assigns to the human species a degraded origin. The doctrine places man in his genesis and development on a level, so to speak, with the beasts which nature has made prone and obedient to their appetites. Man, so far as the testimony of his consciousness is concerned, holds himself strongly aloof from the rest of animated nature. He is able to discover in himself certain mental and spiritual qualities which do not affiliate with any corresponding traits in the animals below him. He has hopes and fears, aspirations and ambitions, musings and speculative reveries, excursive fancy and the multiplication of knowledge, for none of which can he find a parallel in the mental habits of the living beings around him.

Objected that evolution assigns a lowly origin to man.

Man feels instinctively that his nobility as a conscious creature lies in the measure of his departure from the habitudes and nature of the beasts. Any approach to them in his thoughts and manners and instincts is recognized at once by himself as a degradation of his nature and the stultification of all his better parts. The assignment, therefore, of a common origin for his own species and the higher orders of lower animals appears revolting to his nobler sentiments. He feels that his race is scandalized by attributing thereto such a genesis. For this reason the theory of evolution has been strongly resisted as inconsistent with the high estimate which man discovers in his own consciousness of himself, of his origin, and his destiny.

Instinctive sentiment of men respecting their origin.

Such a feeling in human nature is not to be put lightly aside. Observe with care that a sentiment of this kind must itself, according to the hypothesis of evolution, have been produced in man from an instinctive germ of belief developed through ages of growth and variation, and fixed at last by certain conditions as an immutable part of human nature. The existence of such a sentiment and belief must be overcome by right reason and irrefragable proofs before it can be given up and replaced with a totally different concept of the origin and primeval state of human kind.

Such belief itself a result of evolutionary processes.

Let us approach this problem with equanimity. What has history to do with the small prejudices and fluctuating opinions of the current age? She neither courts them nor rejects them. She views them simply as a part of that vast subject-matter with which her volumes of majestic lore are afterwhiles to be filled. History will not espouse a party or range her forces with any of the divisions of human society. Rather must she hold all things in even balance if thereby her own sublime purpose may be fulfilled; for she knows nothing but right and truth.

The antipathy of man to a lowly original for his kind is natural. We must examine the sentiment, however, and discover, if we may, whether such an opinion is really rational or only habitual. In pursuing such an inquiry we may find the best materials of the argument in the history of the individual life of man. This is, without doubt, sufficiently lowly. The beginning of an individual life is obscurely hid among the actions and coäctions of matter and force. In what sense can it be said that the individual man is created? Certainly

Is the repugnance to lowly origin rational or habitual?

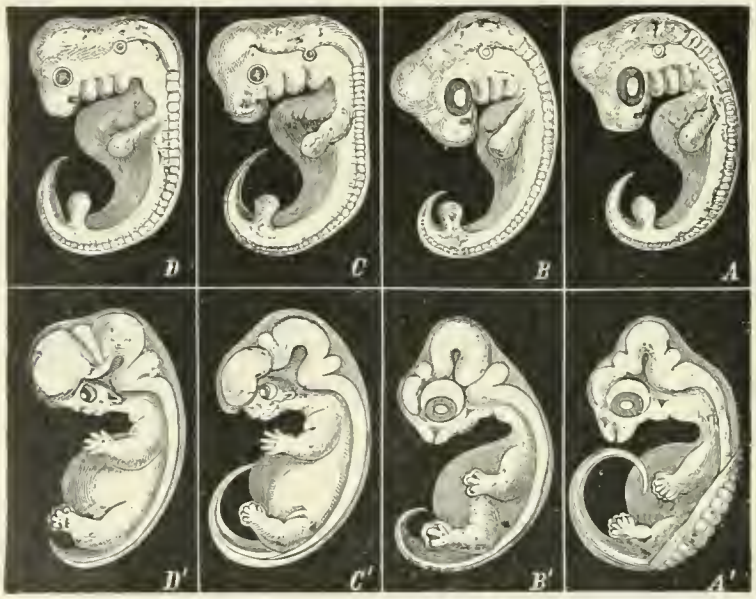
not in the sense that he has been produced in an adult form and a phenomenal manner. On the contrary, every human life begins in obscurity, deep in the inscrutable recesses of a microscopic germ. Thus much is not theory, but demonstrable fact indubitably established by universal experience and attested by all the criteria of science.

Moreover, the first stages in the evolution of the individual life of man are in like manner obscure and obedient to merely physical law. The pattern of the human creature that is to be is the same as that employed by nature in producing all the higher forms of animated being. The living creature that is to be is not discriminable by any test from the correlated orders of life, and is dependent for its future distinction wholly upon a differentiation which is not apparent at the beginning of existence. The physical life of man is thus at the first a series of phenomena identical, so far as science has been able to discover, with the life of other living beings of a lower order.

Obscurity of the first stages in all animal life.

Nor do the evidences of difference rapidly and marvelously appear and multiply; but only slowly, tediously, and without manifest emphasis of purpose. The embryonic human being gradually departs somewhat from the common type, just as in the case of the unborn progeny of one of the lower animals. In the one case the development begins to be manward; and in other instances horseward, kineward, dogward. It is only in the latter stages of prenatal existence that the creature containing within itself the possibility of man begins to show a marked difference from the unborn young of other species of animals.

Difference of human from other animals appears but slowly.



FŒTI OF DIFFERENT ANIMALS—SHOWING THE COMMON PLAN OF NATURE.
(A, A', of tortoise, at four and six weeks; B, B', of the chick, at four and eight days; C, C', of the dog, at four and six weeks; D, D', of the human being, at four and eight weeks.)

Even at birth and after birth the immaturity and imperfection of the human creature are most conspicuous. His organs are, as it were, but potential suggestions of what they are to become by growth and development. As to intelligence, the new-born being has none whatever, with the exception of those animal instincts which are necessary for the preservation of its life. Even these are by no means highly developed. Many of the lower animals come into the world with capacities and instincts of preservative activity far superior to any exhibited by the newborn of human kind. As to physical action, a like inferiority is observable. The infant of the human species can neither rise nor sit,

Weakness and absolute helplessness of the child.

neither stand nor walk. Perhaps of all things living the young of the human race are the most absolutely helpless and dependent.

Nor may the initial evidences of activity in infancy be regarded as indicative of a higher order of life. The infant left to itself sprawls in utter helplessness, moving its limbs in a lawless manner, showing no evidences of adaptation to the necessities of its being. The coming of intelligence, meanwhile, is exceedingly slow. How feeble are the first movements of brain-power and intellection! For many months language consists only of ejaculatory cries, in no manner differently vocalized or more significant than the cries of birds and beasts. Observe the beginnings of speech. First, the organs instinctively produce monosyllabic forms without significance—mere babbling repetitions of meaningless sound. Finally, there is the faint light of imitation. At last the utterance of *one word* is effected, and after a month of effort another! What a beginning for the rushing vocabularies of Shakespeare, Goethe, and Hugo!

Irrationality of first stages in the life of infants.

Meanwhile the bodily functions remain under the dominion of instinct and animal law. The wonder of walking upright is at length accomplished. The child laughs and speaks, and (marvel of marvels!) loves! It begins to be rational; that is, human. Hitherto it has been irrational; that is, animal. Hereafter reason shall more and more arise and assert its sway. There will be the waywardness of childhood, the effervescence and folly of youth, the passion and power of coming manhood, and finally the maturity of power. But how few of human creatures ever reach completeness of individuality and the perfection of reason! How many complete their career on a plane but one degree above that on which the higher orders of animals perform their instinctive and irrational parts in the drama of life!

Evolution of the intellectual powers in childhood.

What we are here to consider is this: The true estimate which every mature human being is obliged to form of his own individual antecedents and history. Man is constrained to accept for himself as a person the lowliest of lowly beginnings. He is obliged to recognize the fact that his own genesis as a living creature has been not only in close analogy with the history of animal life in general, but absolutely identical therewith. Every thoughtful man is constrained to consider himself as once existing potentially in a mass of half-organic protoplasmic cells. He is obliged to reflect upon his embryonic life, upon the fact of his birth into the world, and the insensate animal life which he must needs live during the first year or years of his existence in this strange arena. He must remember himself as prone and under the dominion of animal instincts —living only by the aid of the life and love of others. He must see himself in that far estate abased to a condition of intelligence not comparable for intelligence with that which characterizes the young of the beasts and birds.

Estimate that man must form of his own individual history.

But with what sentiment should he regard this antecedent and irrational portion of his career? Certainly not with shame or with a sense of humiliation. On the other hand, there are reasons which a reflective mind may discover in all this for a justifiable pride in the degree of departure and elevation which the mature and intelligent being has reached from the lowly and unconscious state of infancy. No man can be reason-

With what sentiment mankind must consider itself.

ably scandalized with the thought that he was once a babe and once an embryo. Rather may he comfort and respect himself with the reflection that by the law of evolution, the beautiful processes of unfolding and growth, he has risen to his present sublime stature from so obscure an origin.

Great capacity of the human mind to think and know.

Man at his best estate walks abroad and surveys all nature. He knows the world and its mysteries. The outline of seas and continents is before his vision. The deeps are his. His are the clouds, the panoply of starry sky, the infinitude of systems and worlds beyond. Better than the material landscape is the world within him. Thought is his, and vision and will and purpose. Imagination, eagle-like, sits poised on the vast precipice overlooking the chasm of the universe, and with one bound springs forth on unfaltering wing, circling the profound abyss from shore to shore, from the boundless past to the endless future. But in the midst of this exaltation, this swift review of himself and his powers, he is constrained evermore—but without humiliation—to remember that his organic life began low down in the obscurity of an almost unknown world, amid the occult actions and coäctions of matter and force, even as all other organic life begins from a mere material cell.

No rational shame from contemplation of a lowly origin.

If such be the backward look of the individual life and consciousness, reviewing itself in the light of fact and discovering no shame or degradation in the low estate from which it sprang, what shall we say of that retrospect which surveys the life of the species? Shall any man feel shame on account of the origin of his species? Do scandal and humiliation hold of a remote and undiscoverable ancestry while they do not hold of the origin of the individual? Shall any intelligent being feel himself degraded by the communal divergence of his kind from the great stem of life far away among the mysteries of the prehistoric world, and yet feel no degradation in the fact that he himself, during the first weeks of his organic life, was indiscriminable from the young of an alligator? If the puppy, the calf, and the kid have larger intelligence and freer use of faculties at a corresponding stage of development than have the children of men, shall he who, in full maturity of powers, reflects upon the fact feel a sense of disgrace and abasement under the belief that by remote ancestral descent, extending thousands of years before the dappled dawn of recorded history, the *species* to which he belongs came by differentiation out of the side of that great stem of life which contained the possibilities of all animated nature?

More reasonable to disregard the low origin of our species.

On the contrary, it is far more reasonable that man should disregard the remoter conditions of ethnic descent, and feel the deeper interest in his individual history and the history of his immediate ancestry. It is of more concern to man that his personal genesis should be a pleasing fact, as reviewed in consciousness under the light of memory and reflection, than that his ancestors, even within the limits of a few generations, should have been possessed of certain undesirable characteristics of body and mind. The nearer the fact, the greater its interest and importance. All things sink away and fade into shadow and cloud in the far horizon. But that which touches the present life hath more of vital interest.

The one great history to every human being is the history of himself. Next

to this is the history of that immediate past which he may still see in retrospect or by parallax reflected in the pages of common information. Further on, and of less concern, is that remote past which must be recreated by the skill of the historian and the antiquary. Least of all in interest and attractiveness is that group of facts that lie far off, discoverable only with the glass and from the mountaintop, dimly defined in the morning of days and seasons. It is of less disgrace and harm to a man—a thousand times less shameful to him—that his prehistoric ancestor should have been one of the pithecanthropoids than that his grandfather should have been a robber or himself a villain!

Greater importance attaching to individual life.

It would appear, therefore, that the repugnance of enlightened and intelligent peoples to the notion of an ancestral descent of the human race common with that of the other orders of animated nature is habitual rather than rational. It is a matter of education and sentiment rather than a judgment or a valid deduction. Not to be scorned or contemned is this sentiment, so jealous of the honor and character of that primal stock from which our species is descended. Nevertheless, the suggestion that our origin was the common origin of all organic life is not good ground for the repugnance and disdain which many have shown for such a lowly genesis. The beginning of the human kind may have been as obscure and far removed among the hidden forces of physical nature as is the manifest beginning of all the individual forms of life. But for that reason such origin in neither case is just reason for disdain or for the sense of shame. So far as these sentiments exist respecting the descent of our species from a lower and simpler order of animals than man, they are the result of views and beliefs which can not well endure critical analysis or the higher decisions of reason.

Repugnance to derivation from low orders not rational.

In the formation of the opinions which the men of the nineteenth century still hold, or hold in part, relative to the beginning and first estate of man, the tradition widely disseminated among many peoples of a Golden Age has largely contributed. Most of the civilized or half-civilized nations of antiquity entertained such a view with respect to the prehistoric epoch. It pleased the fancy of the pagan peoples of the Mediterranean to reconstruct a former condition of mankind more elevated and glorious than the current age of semibarbarism and unending war. This dream was one of the prevailing poetic visions with the bards of the Græco-Italic races. They depicted a primitive estate in which mankind were almost as the gods. The first men were taller and stronger than their degenerate descendants. The first men lived the life of peace and happiness. The first men were wise in their kind and virtuous in their lives. The first men tilled the earth and walked abroad as philosophers, gathering the fruits that ripened perennially and sitting at evening in the shade of cool arbors where they discoursed of the gods and instructed each other in the principles of duty and the obligations of fraternity. Such a dream hovered about the imagination of Greece, and even the heavier mind of Rome was invaded at intervals with the presence of this delightful vision of an immemorial past.

Belief in a Golden Age as affecting our opinions.

Doubtless such an opinion came to the Western peoples with their migrating ancestry out of the East. The Oriental nations also possessed traditions and

VISION OF THE GOLDEN AGE.

fables of the golden age. With the ascendency of Rome such a notion in varying degrees of intensity was widely disseminated by her pagan conquests. With the incoming of Christianity—with its acceptance as the religion of the state and the consequent incorporation of Hebrew story as a part, even the foundation, of the new theology—the belief in the antecedent greatness and perfection of mankind was still further extended and confirmed. As far as the new faith extended, so far was the current interpretation of the significance of the terrestrial paradise and its two perfect and exalted beings accepted as the condition from which the human race had descended.

Genesis of the belief in a past age of gold.

The belief in question was further strengthened and confirmed by that unfortunate epoch in human history known as the Dark Ages. At that time all things seemed returning to the primitive chaos. The Roman empire broke and fell. Barbarism came in. Society was disorganized and went to ruins. Darkness supervened over the face of Europe. A belief well calculated to destroy the remainder of hope arose and spread and took possession of all minds. This was the belief in the decadence of man. It became the prevalent opinion that all things were falling away, and that not only civilization but the world itself was doomed to perish.

Effects of the belief in the decadence of man.

For several centuries, as the first millenium of the Christian era drew to its close, this foreboding and gloomy spirit hovered over the human mind. Under its influence men looked back afar to the primitive estate of the race as to a vision of glory and exaltation. The present woe was contrasted in the senses and apprehensions of the people with that far-off and beautiful Eden from which the ancestor of mankind had been driven forth in exile to his death. All these circumstances tended most strongly to fix in the mind a deep-seated conviction of the early excellence and later decadence of the human race—to extend and perpetuate the pagan traditions which have prevailed in many parts of the world respecting a primitive golden age.

Mediævals affected by apprehension of a catastrophe.

As the nightmare of the Middle Ages passed away, when it was seen that the world and the race of man had *not* perished, but that on the other hand there were evidences of revival and restoration, the new and hopeful sentiments of mankind with respect to the present and the future came into contact with the old beliefs respecting the methods of creation and the primeval state of the human species. Meanwhile the creeds of the Church had taken a dogmatic and inflexible form. The interpretations which had been placed on the ancient oracles were held in all things to be literal and exact. When the new astronomy appeared it was confronted with a construction of the Scriptures which forbade its acceptance. The reading which had been adopted of the Book of Genesis made the world the center of our system and the sun and moon and stars its attendant satellites. To disturb this construction seemed to the men of the fifteenth and sixteenth centuries like a destruction of the moral order of the world.

Dogmatic interpretations impede scientific progress.

Every branch of natural science was met with like antagonism and resisted by the adherents of the ancient system. Geology in particular was assailed as unmistakably contradictory of the oracles of truth. The notion of an extended

duration for the world—of the vast eons of time which had been required for the orderly production of our globe—was denounced as a horrible assault upon the divine revelation and an attempt to substitute a bible of atheism for the true wisdom of the Almighty. For espousing and upholding the new belief many suffered and died. From the date of the first dawn of the revival of learning each new stage in the progress of scientific discovery, each new concept which man has gained of the order of the world, and in particular of the history of life, has been resisted and resented as an offense and an indignity done to those sublime standards which were established aforetime out of the literal construction of the ancient records of both the chosen people and the pagan nations of antiquity.

All branches of natural science have been antagonized.

All of these circumstances must be weighed and estimated in making up a current judgment with respect to the value and acceptability of the theory of evolution. That this theory has been repugnant to many cherished sentiments and beliefs can not be denied, and ought not to be neglected in considering the general question at issue. On the other hand, the existence of such opinions, in so far as they are merely habitual and not the products of right reason, ought not by any means to prevail against the acceptance of a larger and more comprehensive concept of the history of life. Just as dogma should not have prevailed against the mathematics of Copernicus and the telescope of Galileo, just as the narrow, foolish, but long-established theory of the phenomenal creation of the earth in six days ought not to have prevailed against the new geology which fought its way through every kind of opposition to final acceptance as the rational explanation of the order and development of the world, so a possibly mistaken notion about the existence of a golden age, in which the first of human kind walked and communed as the gods, ought not to prevail against the evidences of science, pointing as they do with unerring finger to the low estate and primitive savagery of the earliest creatures of the world worthy to take the name of man.

Current opinions derived from dogmatic antecedents.

On the whole, the issue between those who hold the theory of phenomenal creation and those who accept evolution as the law of universal nature and of man is a question of *method* rather than a question of *fact*. Life has appeared on the earth at some *time* and some *place* and in some *manner*. Life did not always exist on the earth. It began to be, and it now is, in full aspect of development. The question, therefore, can be no more than this: *How* did life appear? *How* did it begin? *How* did it proceed from stage to stage? Was the apparition immediate and phenomenal, or was it by slow degrees and evolutionary processes? It is not the *fact* of creation but the *manner* of it that is involved in the whole controversy which has occupied at least three decades of the last half of the nineteenth century. All must concede that organic being has come to pass in some way. The divergence of opinion relates only to the manner and not to the essential fact of a beginning of something which before had no existence.

Real issue a question of method and not of fact.

From these considerations it would appear that the controversy in question has been unduly exaggerated and fanned to an unwarrantable excess of heat. It is only a question as to how the term

Some explanation of origin of species must be accepted.

creation, or the primary production of life, is to be understood. Men are constrained, in virtue of the cause-seeking instinct within them, to form *some* concept of the manner of the beginning. The mind demands an explanation. There is no satisfaction or mental rest without some reasonable apprehension of the methods and circumstances of the origin of life. More particularly the whole question seems to hang about the beginning of *species*. For some reason the obvious origin of the individual life has been overlooked, and the attention of the disputants in this great controversy fixed on the occult question of the beginning of species. Why it is that the manner of the origin of a specific variety of life, belonging as it must do to a remote epoch in the past, should be considered of greater importance in forming a correct theory of the world and of organic being than is the nearby and apprehensible origin of the individual life, is one of the strange circumstances in the intellectual history of our century.

Adequacy of the theory of evolution considered.

As to the adequacy of the theory of evolution to account for the formation of the world and for the methods by which the individual is brought to maturity there can be no doubt. Between these two extremes of cosmogony, in a general sense on the one hand and the individual life on the other hand, lies the intermediate question of the genesis of species, and in particular the origin of human kind. The general tendency of scientific investigation has been to extend further and still further the law of evolution as the method and explanation of the phenomena of all living forms. To affirm that the inquiry is complete, and that evolution is the one sole explanation of all the varieties of life, and of the stages and vicissitudes through which they have passed, is to affirm *more* than the present state of human knowledge would warrant or sustain. To affirm, on the other hand, that the law of evolution applies to so wide a cycle of phenomena as is manifestly the case—that in general it suffices to explain the *modus operandi* of creation respecting the manifold species of animals and plants which hold to the earth as the source of their vitality; but that the law breaks when it comes to the human species, and leaves the great fact of man-life as something unaccounted for and exceptional to an otherwise universal mode of action—is to affirm *less* than the present condition of human knowledge will attest and justify.

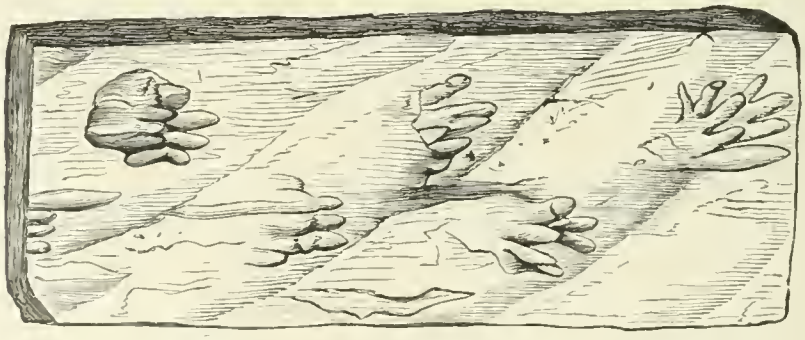
The conflict of scientific and dogmatic opinion subsides.

Thus much is certain, that the battle of dogmatic and scientific opinion respecting the manner of the beginning of life subsides into silence. It has already lost its clangor and sharpness. It sinks into a mild and conciliatory debate. The alarm which prevailed for a season among the timid folk of the ancient camping ground also subsides and is succeeded by returning confidence. It is seen that the world stands fast and that the moral order of the world is not disturbed. Perhaps the acerbity, the violence, of them who attack the existing interpretations of man and nature cools into a rational satisfaction over the changing concept of the beginning and development of organic life. The glowing coals of anger, fanned not a little by the agitation, cover themselves with the white ashes of peace. It has always been so in the intellectual warfare of mankind. It is not true, as many suppose, that the moral deeps are broken up by these disturbances of the intel-

lectual world. After the conflict is over there is always the return of harmony, the blessings of sunshine, the betterment of mankind. There is a renewal of the hand-clasp of fidelity, and mutual congratulations of the contending parties that the inscriptions on the obelisks of truth and right are still clear and sharp as on the morning of the first day.

This better condition of the mind in our age comes of the gradual acceptation of the new truth and the gradual abandonment of the old error. It comes, in large measure, also, of concession and of the willingness of the human mind to be taught in things not known before. It comes of the necessary approximation of views to that common ground which, while it is not the ground occupied by mediæval scholasticism and modern dogma, is, on the other hand, not the ground of an atheistic materialism. It is rather that point of view which accepts an original creative power as the productive energy whereby the beginnings of all life are to be accounted for and explained, but at the same time recognizes the evolutionary processes which are manifestly at work among all existing forms as the *explanation* and *method* of growth whereby the living species of organisms have been brought from their germinal to their perfected state. Under these two general concepts the life of man may be assigned to its true place as the supreme fact connected with our sphere. For the present it suffices to say that creation is a fact, and evolution its universal method.

Approximation of the opposing opinions.



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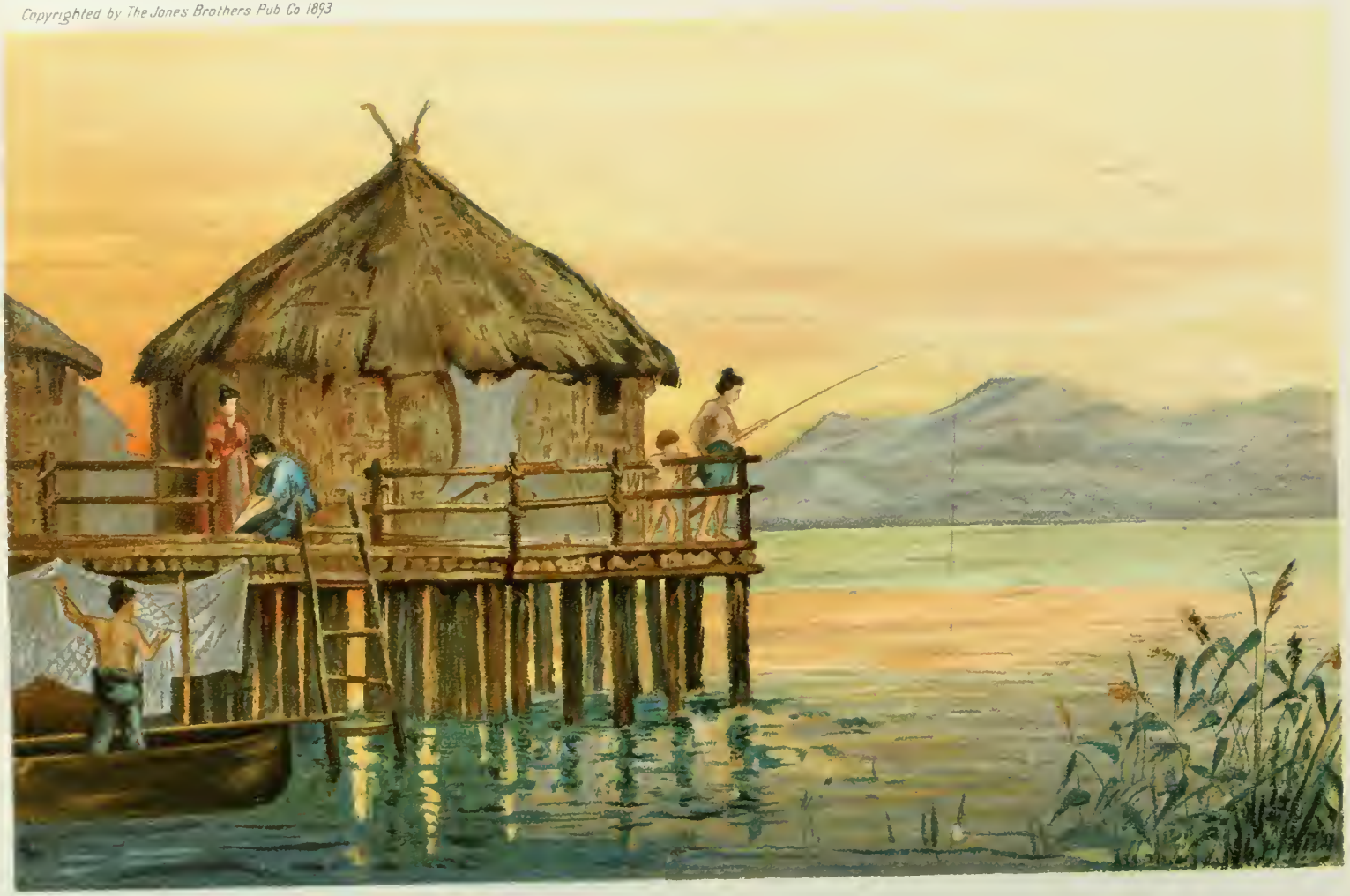


WEST ARYAN BARBARISM. Lake Dwelling of Switzerland.

DRAWN BY GROSZ.

Part Second.

PRIMITIVE ESTATE OF THE HUMAN RACE.

BOOK III.—PRIMEVAL MAN.

CHAPTER XV.—DIVERS ASPECTS OF BARBARIC LIFE.

IT is the purpose in this book to present as much as is known relative to the primitive condition of mankind in several quarters of the earth. The progress of historical science and archæological research has now made us familiar with many aspects of the early life of man hitherto unknown. It is possible, with our present light, to make a tolerably accurate picture of the social phenomena of several peoples in those stages of their development which lie completely beyond the horizon of formal history. Nor can it be doubted that such reconstruction and revival of the primeval conditions of our race, passing from the state of absolute unconsciousness into the semiwaking of the early dawn, will prove of the keenest interest if only the work be patiently and sympathetically performed.

Essential interest of inquiry into barbaric conditions.

It must be understood at the outset that the beginnings of civilization in different parts of the world are exceedingly diverse in their aspects and tendencies. Nothing can be more striking than the contrasts which the early races of men present to the student in their methods and peculiarities of development. Indeed, hardly any two of the primitive tribes of men wrought in the same manner or with the same results. Their work in attempting to construct their

Diverse aspects of the beginning of the conscious life of man.

social forms was as various as the conditions of the primeval world in which they struggled for existence.

From these considerations it will be necessary to an adequate understanding of the primitive condition of mankind to sketch, in the following chapters, several distinct phases of the social and economic life of man as we see the same

Varying activities of man in the struggle for existence.

forest, with his rude implements and utensils, and becomes a man of the woods, a roving hunter, traversing hill and thicket, eating the mast of the oak and the beech tree, living by the hazards of migration and tribal warfare. Still again, he gathers his little group around him on the shingly shore of the northern seas. He rakes from the sand,

Savages of the woods and seashores.

MAN IN THE AGE OF THE CAVE BEAR.—Drawn by Emile Bayard.

obscurely outlined along the far horizon of traditional history. In one quarter of the world we shall see the newborn man take to the caverns for a habitation and defense. We shall see him, with huge clubs in his hands, fighting like a giant with wild beasts, sometimes crushing their skulls and sometimes himself torn to death by their tremendous fangs.

In another quarter man takes to the where the receding wave has been, the shellfish left there by the tide. These he breaks and devours for his subsistence. He builds him a tent, and constructs simple implements for the gathering and preparation of his food. He heaps up around him the waste of his rude methods of life, the débris of his half-savage industry, until his tent is on a shell mound, mixed with broken frag-

ments of his utensils, and bearing thus to future ages the sole evidence of his existence and manner of life.

Still again we see the primitive man driving piles in the margin of the mountain lake and building a platform upon them, and on this platform, above the water, rearing rude huts, from which he reaches the shore by a flattened log or other simple means of transit. Here he is comparatively safe from the attacks of the wild beasts with which he finds himself otherwise unable to contend. Through the rude slabs in the floor in his dwelling he also drops into the water his broken implements of peace and war; and these vestiges of a primitive and peculiar form of life are taken from the mud in our own century to bear witness of one of the strangest aspects of primitive history. As to the so-called patriarchs of antiquity, their well-known method was that of keepers of flocks and herds driven from place to place on the plains of the East, as the spring line of verdure fluctuated over the landscape like the shadow of a cloud.

Primeval man builds for himself a home over the water.

Again, we note those who built for themselves abodes of mud and bitumen. We see the low-lying plain with its cubical houses of clay or sun-dried bricks, and are surprised to observe that what some primitive tribes of the Orient did in the dawn of their nationality thousands of years ago, the Arizonian races of Southwestern North America have reduplicated, in every particular, in their attempted emergence from barbarism. In all the central regions of the New World the Red Man will invite us with his wigwam to scrutinize his manners and customs and to note, not without sympathy, his hopes and aspirations.

Barbarian abodes of clay or sun-baked bricks.

ASPECTS OF BARBARIC LIFE.—Hut of Ostiaks.—Drawn by Durand Brager.

Far to the north the frozen ice huts appear, with their stunted but resolute inhabitants braving the rigors of the

frigid zone, kindling the fires within them and without from the same heavy carbonaceous elements furnished by the monsters of the deep. All these and many more are the peculiarities of primeval life which will demand our attention in the the present book.

It can but be of interest in this connection to discuss briefly the question *why it is* that such radical differences existed among the primitive tribes of men in their methods of organizing themselves into societies. What were the causes of so great divergences in the early life of man? It would be inferred, *à priori*, that all semibarbarous peoples in their emergence from savagery would, under the influence of instinct correlated with their environment, adopt almost identical methods in their struggle for existence and progress, and present a common type of development; but the facts are utterly at variance with this hypothesis. To the casual observer, indeed, it would seem that the diverse methods, the opposing manners and customs, and the contradictory institutions of primitive mankind, were the work of caprice rather than of reason and order. A closer study of the problem, however, will doubtless show that in this also, as well as in all other elements of human history, law has been the dominant principle and reason the guiding light.

Why do savages thus differentiate in manner of life?

ASPECTS OF BARBARIC LIFE.—SEARCH FOR THE SKULLS.—Drawn by Riou.

ASPECTS OF BARBARIC LIFE.—Patagonians Fishing.—Drawn by Riou.

Doubtless the first great cause of the divergences noticeable in the beginnings of civilization between the methods of one tribe or family of men and those of another, is the varying influences of nature reäcting upon the human frame and faculties. The aspects and conditions of the external world are far removed from regularity. Every region has its own climate, its own aspect of earth and sky. As to the earth itself, its surface is variable in the last degree. The soil has different potencies. The water distribution passes through all grades from scarcity to abundance, from the blistering desert to the dripping humidity of rainy islands. The surface in some parts spreads out on a dead level of valley or plain, and anon rises into hill and cliff and mountain. The running streams are equally irregular in their disposal. Some regions have the rivers as the basal fact in their constitution, while in others the range of highlands, the rocky ridge or snow peaks scattered at intervals, are the fundamental condition of geography. Greater still is the variation of heat and cold, from the rigor of the hyperborean regions to the furnace of the tropics; and, if possible, the differences in the electrical and magnetic forces that girdle the earth and impart a certain nervous tension to all animal existence are even more pronounced and remarkable.

First cause the reäctions of nature on human faculties.

Under these varying circumstances of the external world the plants on its surface and the living creatures that subsist thereby fluctuate and change in their instincts and manner of life. Particularly does that supreme animal called man fit by multifarious adjustments into his changeful environment. From his superior and more refined organization he is especially susceptible to the influences of the external world. More than any beast of the field does he sway and bend and conform to the climatic exigencies under which he is placed. In him the sap of the world circulates almost as palpably and potently as in the plant that fixes its roots in the soil. In him every varying condition of the outer world is reflected; and in him the very tone and rhythm and pulsebeat of universal nature find a perpetual echo and response.

Man especially susceptible to influences of the natural world.

These considerations are fully borne out by an actual examination of the primitive life of man in process of development under the varying conditions of nature. Indeed, no stage of human growth is exempt from the domination of the natural world. Every part and filament of the garb which civilization wears has taken its form and color and substance in large measure from the material elements and conditions under which it is woven. It can not be doubted that all the aspects of the life and endeavor of man have in them, when closely scrutinized, the outline and semblance of physical conditions caught by reflection from the external forms and circumstances of his environment and home.

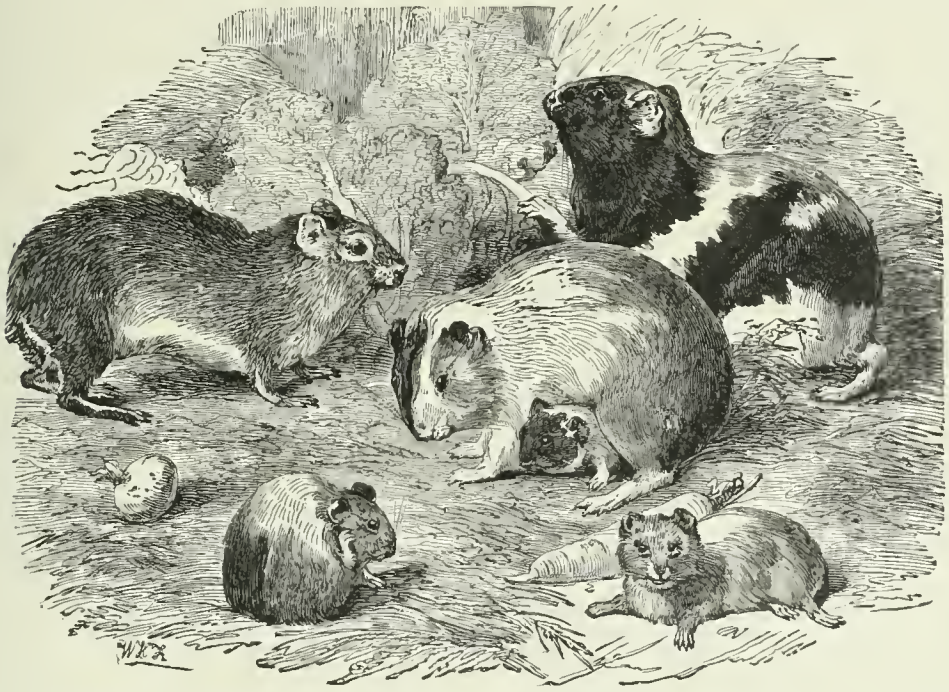
All parts of civilization tinged with environing conditions.

So palpable and powerful have been these influences of the external world on the development and character of the human race that many authors have been disposed to make them the be-all and the end-all of the civilization of man. By such writers the theory of a physical basis for all things has been confidently adopted; and it is urged, without doubt or hesitation, that even the highest and most spiritual faculties and moods of the human mind are resolvable by easy

Theory of environment has been stretched too far.

process into elemental parts derivable from nature.

Under this hypothesis man is regarded simply as a plant with powers of locomotion and consciousness. True, his feet do not strike into the soil. He has no local attachment to the ground out of which he has sprung; but like those vegetable anomalies which grow freely in the open air or water without the formality of roots and tendrils, so man, in this view of his genesis and nature, grows and develops into conscious life and powerful activity by the mere absorption, from his free surroundings, of all his elemental juices, his fibers, and his faculties.



VARIABILITY ILLUSTRATED IN MULTIPLE YOUNG OF SAME MOTHER.—GUINEA PIGS

But this view of the case is inadequate to the solution of the problem. The theory of a physical basis of civilization is by no means to be rejected as a chimera. It is simply insufficient *of itself* to explain and elucidate the phenomena to which it is applied. Nature has, indeed, done much to give form and fashion to the various and divergent aspects of human life; but there are many differences existing in the methods employed by primitive, and even by civilized, peoples which can not be so resolved and explained. Another general cause comes into the field of vision, and that is the influence of innate instincts and dispositions in mankind, working in some instances toward one end and in others to an opposite or diverse result. That such native and inherent differences do exist in human kind can not be doubted, and that the influence of the same has been largely potential in producing the various aspects of early civilization is, it is believed, susceptible of the clearest proof.

Ethnic instincts also prevalent in forming mankind.

If we descend into the germinal conditions of the vegetable world we find that even the plants are, in virtue of their own nature, impressed with great

variations. The seeds taken from the same pod and planted in the same bed

MIGRATORY BARBARISM.—Camp of the Kirgheez.—Drawn by Emile Bayard.

and nurtured under identical conditions exhibit in growth and development distinct and unmistakable evidences of divergence and individuality. If we go forward one stage and begin an examination of the phenomena of animal life,

we find the divergent principle still more active and emphatic. In the multiple young of the same mother we have the variability of nature illustrated in every element of organization. The color is different. Some are black, some are parti-colored, and some are white.

The law of variation independent of environment.

procreative act, developed in the same matrix, and thrust into the world under identical conditions, are more than approximately alike.

Take, for instance, the pointers and setters in which the hunter finds so great delight. Never yet, perhaps, have two of these animals, under the strictest dis-

SEDENTARY BARBARISM.—HOUSE OF GREENLAND ESQUIMAU.

Similar variations, though perhaps less pronounced, will be discovered in form and function. One outgrows the other. One is of superior activity; one is hardier, and another has by nature a greater longevity. If we proceed to scrutinize the instincts and dispositions of the group the differences are still more marked. In fact, no two of these living creatures, produced by the same cipline of the same master, been developed into identity of method and character. The law of animal life in this respect is susceptible of infinite illustration. Every species of living creatures is still in a state and process of differentiation under that primal law of evolution which tends to individualize all forms of life; and as we ascend in the

Animal life under like conditions shows divergences.

scale of being the action of this law is constantly increased in vigor and intensity.

In man and among races the the law of diversity prevails.

In man the presence of the divergent and individualizing tendency has been especially powerful from the beginning. The primitive races had each its special instinct and individual character. No two of them were moved by the same innate impulses or the same conscious purposes. The ends of tribal endeavor were as diverse as the methods employed to reach them. And it is the existence, radically, in the human family of this difference of instinct and motive that, combined with the powerful influence of the natural world reäcting upon the sensitive faculties of man, has produced the striking and peculiar differences, oppositions, even antagonisms, which we discover in the primitive history of mankind.

Migratory habit of tribes based on innate differences.

As an illustration of the working of these innate divergent tendencies in the human race, take the great fact of tribal migration. In the primitive history of the world no other fact, perhaps, has so great prominence as has the migratory disposition exhibited by the early races; but the working of this instinct was exhibited by them only in part. That is, there were conservative tribes and radical tribes in the primeval world, the former of which gave no sign of the migratory impulse, while the latter were swayed thereby to the extent of having no other history than that of removal.

A closer analysis will show that in the same tribe the migratory disposition would appear, seizing like an insupportable passion upon some members of the clan and household, while others would be exempt from its influence. A division of sentiment would appear among these unconscious folk leading to a radical difference of tribal action and policy. A break-up among the family would ensue, a part drifting away under the action of an instinct as natural and inevitable as that which drives the bee swarm from the parent colony to the distant forest. That is, in a given household some members, born under identical conditions with the rest, would feel the moving passion and go, while the rest, unswayed by any such instinctive motive, would remain in their native seats, unable even to appreciate the impulse and disposition which had separated their kinsmen from them. The Orient is to-day, in some sense, a residuum of those peoples over whom the migratory passion was never dominant, while all Europe and America, even to the shore line of the Pacific, is, in a like sense, the result of a certain innate radicalism which has forced the moving races further and further onward, until at last it threatens to leap the greatest of the oceans and precipitate itself again upon the East.

The moving passion varies in the same community.

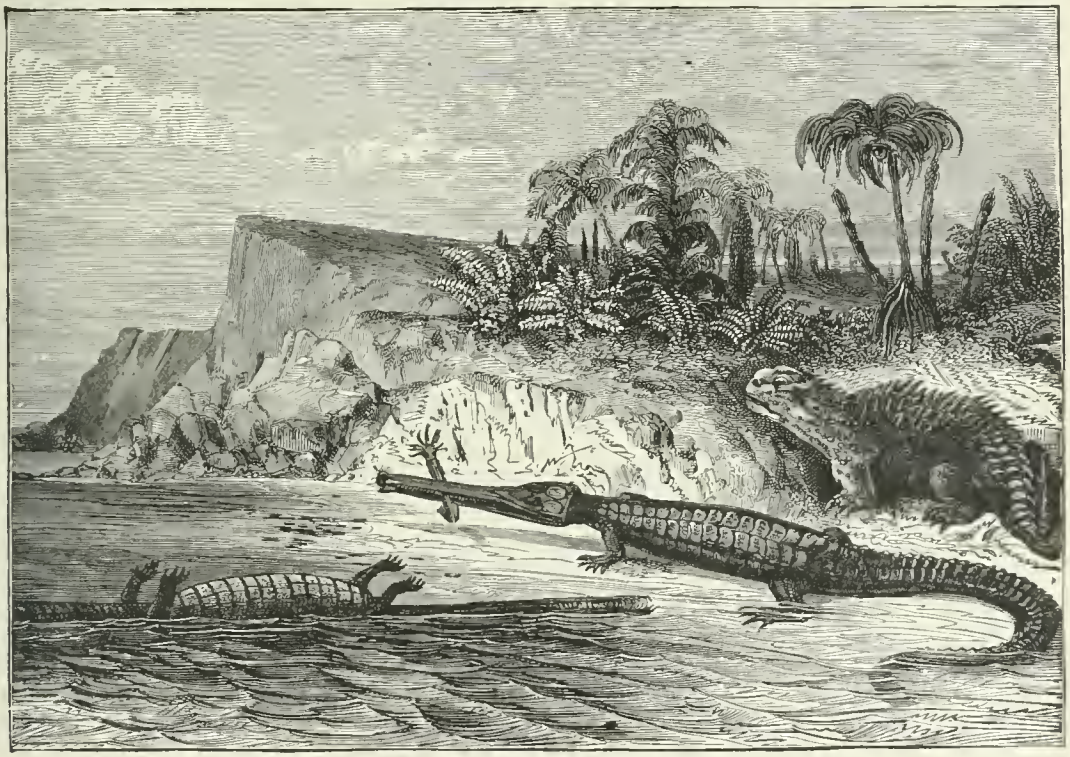
This division of mankind into a migratory and nonmigratory part must have been based, in its ultimate analysis, upon innate differences and unconscious, unreasoning impulses in those original tribes from which Asia and Europe have alike been peopled. Nor can it well be understood how the influence of the external world can adequately account for the true genesis and primal workings of this migratory habit.

CHAPTER XVI.—THE CAVE DWELLERS OF EUROPE.

LONG before the incoming of the first Aryan peoples into Europe tribes and races of men were already diffused over the country. Nor is it possible for us, in the present state of knowledge, to pierce the bottom of these human strata and find the actual beginnings of the life of man on the European continent. It is now clear that the first men roaming about in a state of savagery through the forests of Denmark, of Germany, of France, and of Britain were contemporaneous with several races of animals that were extinct before the beginnings of authentic history.

Contemporaneity of man and certain extinct animals.

For the present, archæological and ethnical inquiry has reached down only to this epoch when the aborigines of Western Europe were contemporaneous with certain extinct species of animals. It is here that we must begin our inquiry relative to the primitive life of man in those parts of the world with which we are most familiar. It is well to repeat that the period here referred to is anterior to the time when the first Aryans —the Celts, the Italic tribes, and the Teutones—made their first inroads into the West.



IDEAL LANDSCAPE OF THE AGE OF REPTILES.—Drawn by Riou.

It is only within the present century that our knowledge relative to primeval man in Western Europe has taken a somewhat definite form. Such inquiry has been impeded by many prejudices

and prepossessions of the human mind—many beliefs which are no longer tenable under the light of increasing knowledge. The labors of several eminent archæologists and ethnologists, such as Sir Charles Lyell and Sir John Lubbock in England, Messieurs Tournal and Christol in France, Dr. P. C. Schmerling in Germany, and Professors Steenstrup and Nilsson of Sweden, have brought the resources of their genius to bear upon the problem of the antiquity and primitive life of man, and have succeeded in reconstructing the primeval conditions of civilization.

Modern leaders of archæological inquiry.

the cave dwellers of Western Europe flourished. If we examine the crust of the earth *above* those strata which constitute the so-called age of reptiles, we shall find the same to be divided into two great layers, the lower of which is called the Tertiary and the upper the Post-Tertiary Period. The post-tertiary period is itself composed of two strata, the lower of which is called the Post-Pliocene and the upper the Recent, which latter embraces, in general terms, what is popularly called the surface of the earth. These two periods, the tertiary and post-tertiary, cover the geologic age of mammals. The mammalia are

Post-Tertiary	Recent		Cenozoïc Time—Age of Mammals.
	Post-Pliocene [Epoch of the Cave Men]		
Tertiary Period. .	Pliocene.....	Newer Pliocene	
		Older Pliocene	
	Miocene.....	Upper Miocene	
		Lower Miocene	
	Eocene.....	Upper Eocene	
		Middle Eocene	
		Lower Eocene	

DIAGRAM OF THE TERTIARY AND POST-TERTIARY PERIODS, SHOWING THE GEOLOGICAL PLACE OF THE CAVE DWELLERS.

In the present chapter it will be the aim to present the leading features of tribal life as the same are illustrated in the story of the Cave Dwellers of Western Europe. There was, in prehistoric ages, in many parts of the western European states a race of men of a low grade of culture who chose the caverns which nature had hollowed out as their abodes, and within these dreary domiciles enacted the domestic drama of their lives.

Place of the cave dwellers determined by geological data.

It is desirable to note the geological epoch, now well determined, in which conterminous with it, having first made their appearance in what is called the Lower Eocene and having a continuous existence through all the upper strata. Chronologically speaking, the period here referred to, beginning with the bottom of the tertiary and reaching to the present, is called Cenozoïc time. The above diagram, drawn according to Sir Charles Lyell, will show the various relations of these strata and the place of the cave dwellers.

It must be understood with reference to the above diagram that all existing species of mammals and man himself

belong to what is called the recent, or quaternary, epoch. There were, however, several species of great animals formerly well known in Europe, whose existence as distinct varieties reached up from the pliocene period of the tertiary epoch into the post-pliocene era, and in that era ceased to exist. It appears that certain climatic changes took place in Europe, rendering the country untenable to these forms of life.

Man belongs to the recent, or quaternary, epoch.

Now it is in this post-pliocene epoch that the cave dwellers had their career. It was at the time when the species of animals just mentioned were still prevalent in the west of Europe that the cave man had his abode there. He was their companion and fellow of the woods and caverns; and it is by the commingling of the débris and ruins of his savage life with the relics and vestiges of the extinct mammals above referred to that the demonstration of this early form of existence on the earth has been made. The proof that man was contemporaneous with several varieties of animal life no longer present in the countries where it formerly flourished, is clear and irrefragable, and it only remains in the following pages to determine as much as we may of the primitive condition in which the cave man held his barbarous fortunes.

Extinct mammals coïnhabitants with man in Europe.

IDEAL LANDSCAPE OF THE CRETACEOUS PERIOD.—Drawn by Riou.

The savage races of men, on their way from the low condition in which they are still found in absolute barbarity to civilized peoples, pass through four epochs of development. These are determined by archæologists chiefly by the character of the implements and utensils which are fabricated by primitive peoples in the different stages of their progress. It had been found that

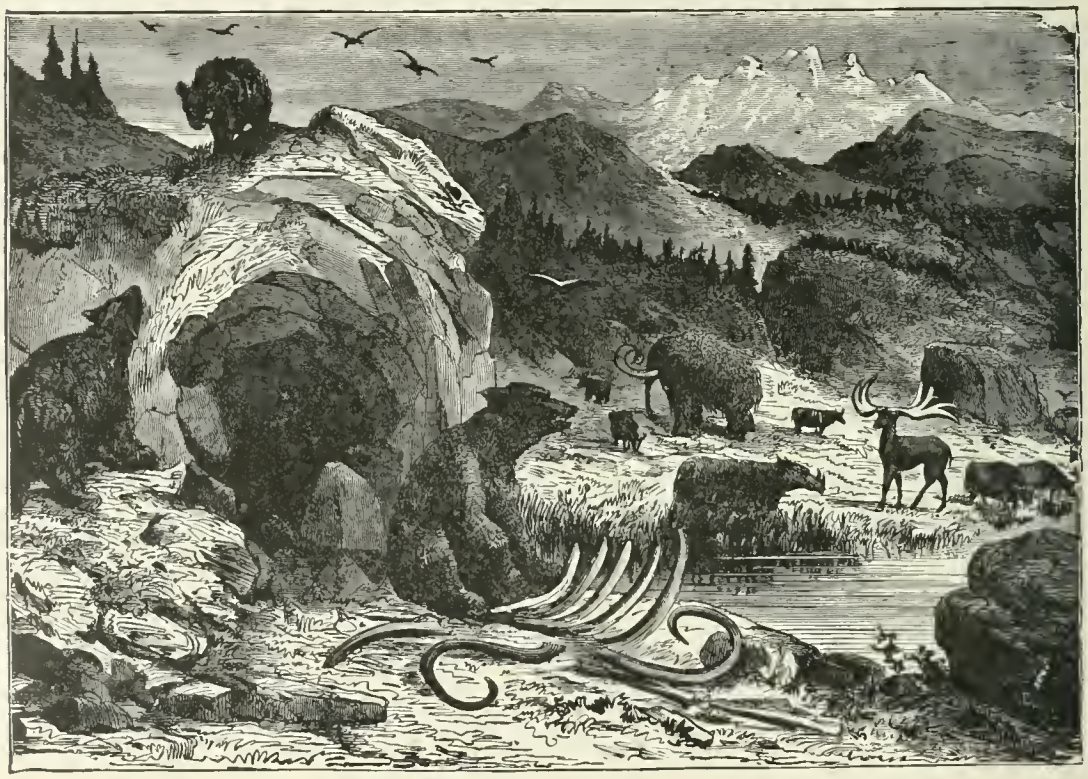
Savages pass through definite stages toward civilization.

this progress is uniform in all parts of the world, and that when barbarians are discovered in a given stage of growth the next stage may always be inferred by the general law which governs the evolution. This movement forward proceeds from a grade of life but little above mere animality, and ends with the emergence of the tribe into full historical activity.

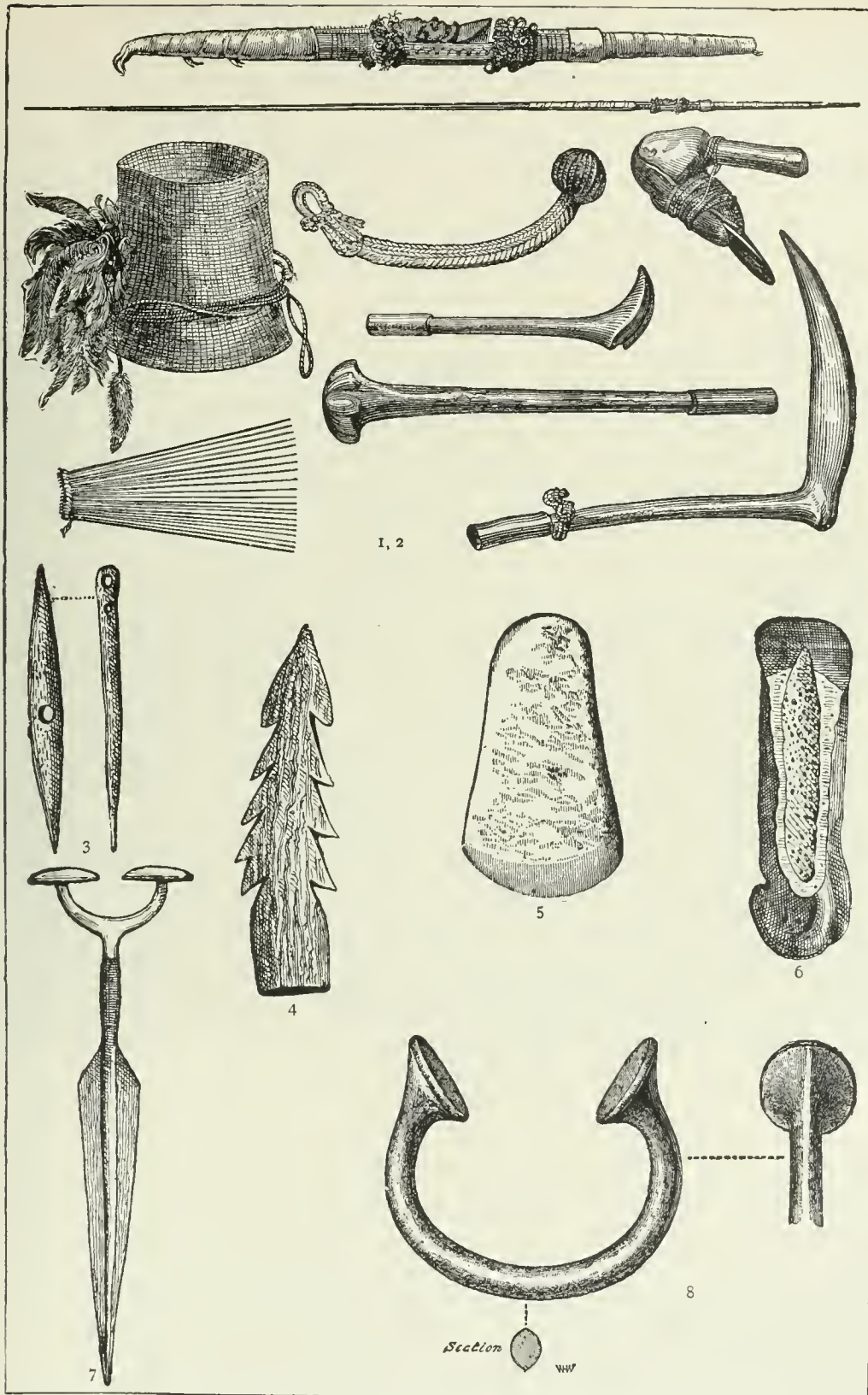
The various materials which the races of men have employed in the fabrication of tools and utensils are principally stone, wood, bone, horn, copper, bronze, and iron—in the order named. Among civilized peoples the latter metal is refined into different forms of wrought iron, cast iron, and finally the various grades of steel. The primitive man, however, begins with stone. He takes from the ground, by a sort of natural selection, certain varieties of rock formation, and by simple modifications, or even, at the first, by no modification at all, converts them into implements.

Materials employed by barbarians in making implements.

The materials first chosen are generally flint and obsidian, and the primitive stage of workmanship consists in merely breaking the substance into shape. It is this fact of breakage into form, as distinguished from other methods of fabrication, that marks the very first stage of man's development as a tool-making animal. Perhaps in no quarter of the world has a savage tribe emerged from barbarism without employing this very obvious method of producing implements. It is claimed by the most eminent naturalists that man, even in the most rudimentary stages of his evolution, has been a tool-making and tool-using animal, and that he is discriminated by this fact—strongly dis-



IDEAL LANDSCAPE OF THE PLEISTOCENE PERIOD (AGE OF MAN).—Drawn by Riou.



IMPLEMENTS AND ORNAMENTS USED BY PRIMEVAL MAN, IN THE ORDER OF THE MATERIALS EMPLOYED.

1, 2, Stone and wooden weapons of New Caledonians; 3, bone skewers; 4, harpoon of stag's horn; 5, copper celt; 6, carpenter's bronze chisel; 7, bronze dagger with iron handle; 8, iron ornaments of Africans.

criminated—from the highest grades of living beings below him.

No animal except man has been known to make or to use a tool. That is, the conscious design of doing so has never been observed in the most superior specimens of the lower grades of animal intelligence. The monkey, the ape, the ourang, the gorilla, and the chimpanzee are all in some sense club-using and club-throwing animals. They grip and swing missiles with obvious design to a certain end; but in doing so they merely seize what accident has placed within their reach, and there is no single instance recorded in which an animal has been known to *adapt* a stick or stone to any intended use. Between this accidental and instinctive employment of clubs and missiles and the conscious fabrication of a tool lies a great gap in intelligence—the gap between the instinct of the inferior and the conscious reason of the superior creature.

Man the tool-making and club-throwing animal.

Man, then, begins his career as an artisan by the making of tools and implements from the flinty forms of rock.

MANUFACTURE OF FLINT IMPLEMENTS BY PREHISTORIC MAN.—Drawn by Emile Bayard.

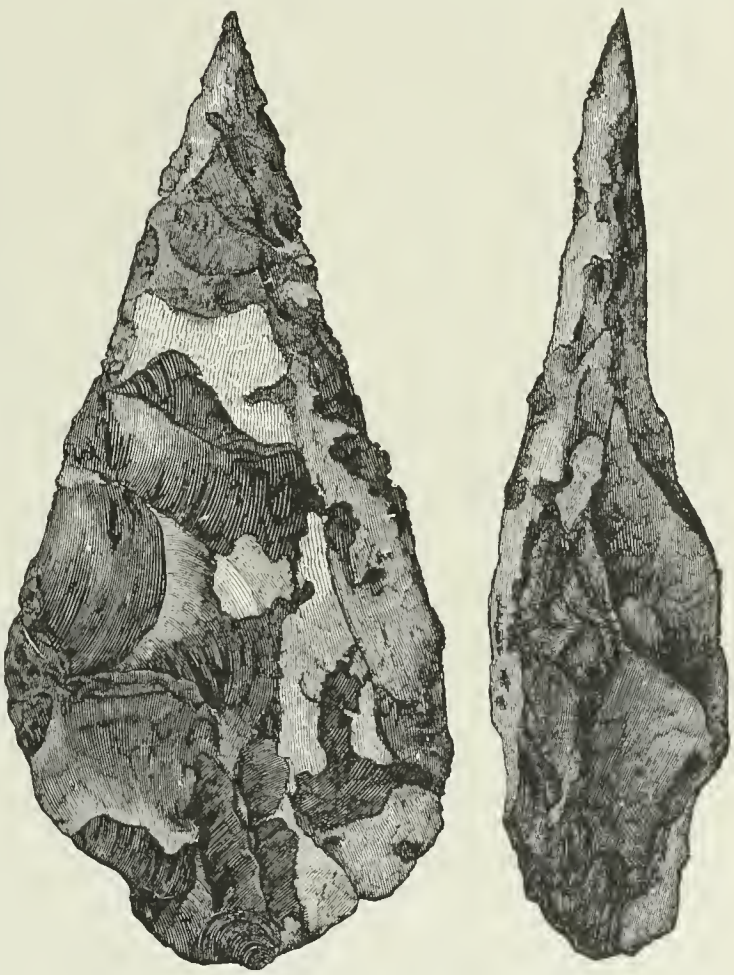
He soon discovers that this substance, by a little skill, may be broken into forms approximately adapted to his wants. Progress begins—progress in the selection of materials and progress in the methods of forming his utensils. But for a long period breakage is the general method which he employs, and this fact of fracture in the fabrication of

Artisanship begins with the making of tools and weapons.

tools is the essential feature by which the first stage of human development is characterized.

Old stone age marks first stage in human development.

This first epoch is called the old stone age, or, if we employ the scientific term given thereto by naturalists, the palæolithic age—a term derived from the Greek roots signifying the same thing. It is impossible to determine for how long a period a savage tribe will remain in this primitive stage of evolution. Doubtless the palæolithic era of development is never precisely the same in time in the case of any two barbarous tribes, but the process is the same. The time remains indeterminate. Another fact of great importance to be noted is that this primeval epoch of human growth has appeared at different times, in different quarters of the earth, as already said. It is highly likely—almost certain—that all existing peoples have, in their rudimentary condition, passed through the old stone age as the first phase of their growth into a national life; but at what era this occurred in the case of any given family of men it is impossible to determine.



PALÆOLITHIC FLINT IMPLEMENTS, FROM HOXNE.

Chronology of palæolithic epoch not determinable.

The chronology of such a development can not be ascertained or adjusted. In one quarter of the earth a savage tribe will be found at the present day in the palæolithic state of growth. In another quarter this epoch of emergence from barbarism has been passed a century, even several centuries ago, and in others we must look back through many ages if we would discover even the hint of such a stage of evolution. This is to say that the development of savage life is never synchronous among the different races, but that such development is as various in time as it is in place. The process has been going on for many thousands of years and is still going on, under our own authentic observation, in many parts of the unreclaimed continents and barbarous islands of the seas.

While this want of contemporaneity is

an embarrassment in the construction of tribal history, it is a great advantage in the actual comprehension of the methods of the primitive man. We are able today to scrutinize these methods and to observe and note the actual processes by which the tool-making animal goes forward from one stage of his development to another. In the South Sea islands the natives have been watched in the act of constructing old stone implements, and the process, withal, is very different from what might have been supposed. The savage takes a small block of flint between his naked feet and, pressing it into a certain position with his toes, drops upon it endwise a long pestle of wood in such way as to spall off a splinter from the side. The stroke is repeated, and another spall, or "flake," so called, is thrown off; and so on until, by careful chipping, the arrowhead or spearpoint or whatever it is is broken into shape. Doubtless this simple process has been practiced, with slight modifications of method, by all the savage tribes of the world, and doubtless the same manner of fabrication will continue until,

PRIMEVAL MAN—CHASE IN THE REINDEER PERIOD.
Drawn by Emile Bayard.

Habits of primeval man discoverable in his materials and arts.

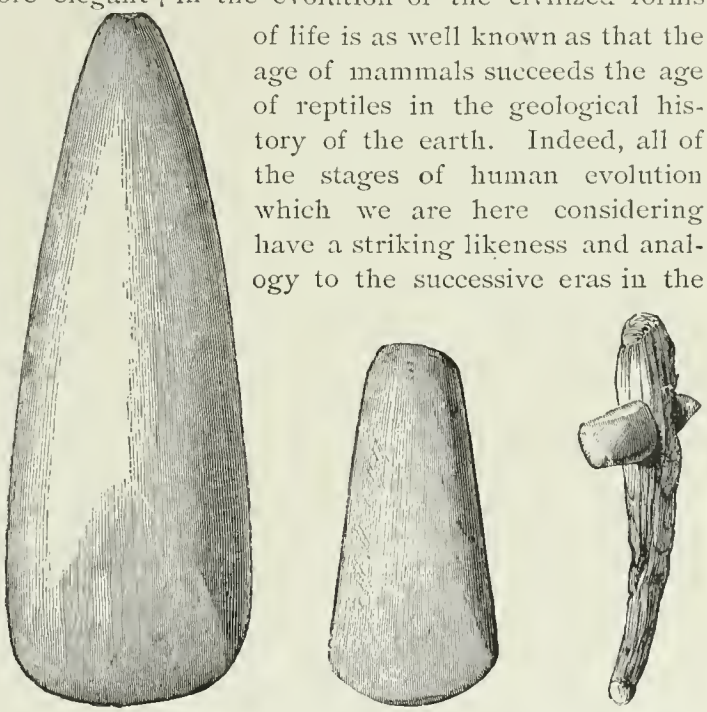
by the spread of civilization, this primitive stage of humanity shall disappear from the earth.

The palæolithic, or old stone, age at length gives place to a higher form of manufacture—a more elegant and useful method of making utensils and weapons. The primitive man, in course of time, discovers that by attrition or rubbing he can reduce his tools to a more elegant and satisfactory pattern. The forms which he has hitherto attained by the process of breakage and chipping have been only approximate to the ideal forms which he has had in mind. In the second stage of his development he labors to reach a correct outline by reducing the substance on which he is working into proper form by rubbing or grinding against some other material. The time relations of this discovery also are unknown; but that such a transformation from the rough or broken stone implements of primeval man to the smooth tools and utensils of his secondary stage of development does exist—has existed in the case of every tribe—is clearly demonstrable. Every museum, or even small private collection, of ancient stone workmanship gathered from the valleys of the European rivers, from the peat bogs of Denmark, or turned up by the plow in the open fields of North America, will show unmistakable evidences of the change which has everywhere taken place from the age of broken or chipped-off fabrication to the age of smoothed or polished manufacture.

Neolithic workmanship marks second stage of the evolution.

To this second epoch of implement-making archæologists have given the name of the new stone, or neolithic, age. That it follows the older and ruder era is clearly proved, but its duration, as in the case of the preceding epoch of broken stonework, can never be more than approximately determined. The relative place of the neolithic era in the evolution of the civilized forms of life is as well known as that the age of mammals succeeds the age of reptiles in the geological history of the earth. Indeed, all of the stages of human evolution which we are here considering have a striking likeness and analogy to the successive eras in the geological formation of our globe. The one is as fixed and certain in its laws of succession as the other, and we should no more expect to find a deviation from the orderly progress by which the savage man proceeded from the old stone to the new stone and from the new stone to the subsequent ages of his development than we should expect to find the coal measures of the carboniferous age on top of the chalk beds of the age of reptiles.

Relation of the stone epochs to eras in geology.



Stone axes, Ireland. Stone celt with handle.

EXAMPLES OF NEOLITHIC WORKMANSHIP.

There are many extraneous proofs,

moreover, that the half-barbarous peoples of the world, after passing into the neolithic age, have, in other respects than that of implement-making, entered into a wider and more complex development. It is not only in the making of tools that the savage man on his way to larger and more rational activities displays his increasing skill. All the elements of his progress are correlated and, in some sense, kept even with his rate of growth in the mere matter of manufacturing his wares and weapons. His expansion is in all directions, and it is easy to discover by evidences deduced from other sources the general course which he is pursuing toward the civilized conditions of life.

Complex development coïncident with new stone age.

Since most of the metals of the earth exist in the form of ores, which hide their actual contents from the unskilled eye of barbarism, it has happened among all the primitive races that the discovery and manufacture of stone implements has preceded by many long stages the production of metallic forms. In the cases of silver and gold, which exist native in the earth—or at least the gold—they have never been found in sufficient quantities to justify the primitive man in the attempt to make implements therefrom. These, from the rarity of their distribution, have been precious metals from the first. They were so to all the savage races who first possessed the earth, and have continued so, even

Great span between ages of stone and age of metals.

PRIMEVAL MAN.—Founders of the Age of Bronze.—Drawn by Emile Bayard.

in the powerful civilization and activities of the present. Among other metals copper, and even tin, also existed in the native form, and it is to these substances that the faculties and interest of the primeval man were directed when he came to the point of emergence from the neolithic age. He had now wrought, as much as might well be done, from the stone materials under his hand by the processes of breakage and polishing. It is evident on reflection that mere stone, such as flint or sandstone, will only bear a certain amount of artisanship. Whoever would attempt to go beyond the natural limits existing in the nature of these materials would come to an impassable barrier. He must turn, perforce, to some other substance upon which, in virtue of its own nature, his faculties might find a freer exercise. This other substance, as the primitive history of man has now demonstrated, was copper—copper first, and then tin, or, more particularly, a mixture of the two, called *bronze*.

Nothing is known of the original discovery which seems to have been made in many quarters of the earth, of the great advantage to be gained by commingling a certain percentage (about one tenth) of tin with native copper. Such a discovery, however, is very certain as a fact and very remote in its date. It is now known that the material of the weaponry of the Trojan warriors, called *chalchys* in the Homeric poems and tradition, was bronze and not iron, and the old word *æs* of the primitive

MANNERS OF PREHISTORIC PEOPLES.—FEAST IN THE AGE OF BRONZE.—Drawn by Emile Bayard.

Art of compounding metals; coming of the bronze age.

Latin race signified the same thing. At any rate, the succession of an age of bronze to the neolithic age is a fact well established in archæology. The barbarous and now warlike peoples of the prehistoric world made the great discovery of a hard and tenacious metallic compound, out of which they could manufacture at will substantial, effective, and even beautiful implements so greatly superior to those which they had hitherto employed as to constitute an epoch in their civilization. This discovery of bronze was accompanied with many advances in the life and manners of the people. New customs were introduced; the family was better organized, and we contemplate the beginnings of a rude society. So the third stage of the human evolution which we are here considering was that in which the half-barbarous peoples of the primitive world passed out of the new stone age into the age of bronze.

The inquiry naturally arises in this connection why it is that in nearly all parts of the earth the barbarous peoples seem to have passed directly from the neolithic into the bronze-making age of development. Why was it—why is it—that the primitive peoples did not pass through a clearly defined age of copper or an age of tin? Why should the great leap have been made from so primitive form of life as that exhibited in the new stone age into the comparatively complex and highly developed activities of the age of bronze? Bronze is a composite metal. We see from the perfect composition which we find in the implements which have come to us from the age of its early manufacture that the ancients understood perfectly the percentage of the different metals, and this knowledge would presuppose a long series of trials and experiments. True it is that in some quarters of the world, particularly in the peat measures of Denmark and along the shores of the great lakes in North America, many copper implements have been discovered. But these finds have been so irregular as rather to disprove than to establish the existence of an age of copper. It would seem that the primitive man has only produced tools and utensils of copper when he could not procure the necessary tin to make the compound. In general, the fact remains, archæologically and historically, that in nearly all parts of the habitable globe the various races have leaped at one stride from the making of smooth stone implements to the manufacture and use of bronze. What theory may be advanced to account for this remarkable fact in the prehistoric development of mankind?

No intervening ages of copper or tin.

It has been suggested in answer, and with much show of probability, that the introduction of metals for tools and weapons is coincident in tribal development with the beginning of the age of aggression and conquest. This is to say that when men have once discovered and used the metals they are at that stage of tribal life in which the lust of war and conquest begins to be felt as a dominant passion. As a result of this, when the discovery of bronze has once been made, and a knowledge diffused of its great superiority over either of the component metals of which it is constituted, a bronze-bearing soldiery would at once spring into existence. Owing to the higher development and aggressive instincts of this soldiery, conquest in foreign parts would very soon ensue, and with this conquest would be carried into distant regions a knowledge of

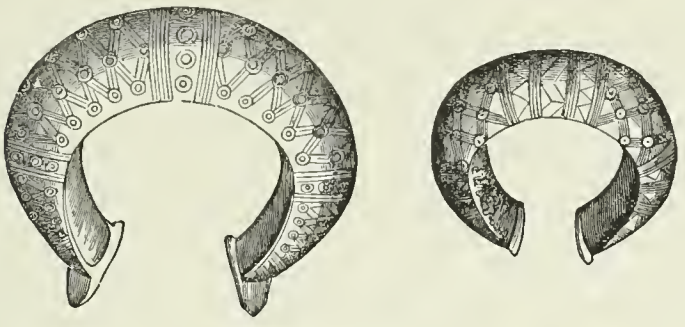
Reasons why the age of bronze succeeds the age of stone.

bronze and of the method of its manufacture. This rational, even probable, explanation has been offered for the immediate succession of the bronze age to the age of stone. Tribes and races still engaged in the fabrication and use of flint implements and weapons would be at so great disadvantage in comparison with a bronze-bearing nation as to be easily overrun, and with this conquest the knowledge and practice of bronze manufacture would immediately follow.

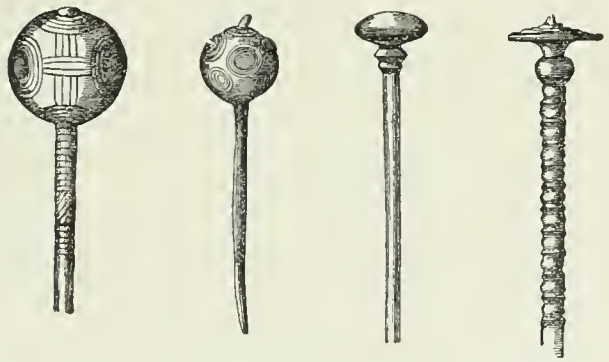
However this may be, the age of bronze has everywhere succeeded the neolithic age in the development of civilization. It is in this age that we generally catch the first authentic glimpses of the actual historical movements of men. The heroic conflicts which we see in the far horizon, the sack and pillage of Troy, the early and shadowy movements of mankind in Asia Minor, in Hellas, and in Italy, bring us, at least in tradition, into the age of bronze, and it is safe to regard this epoch in the evolution of man as the substratum of authentic history.

Historical consciousness begins with the age of bronze.

Egyptian knife.



Bracelets, Switzerland.



Bronze hairpins, Switzerland.

Copper spearhead.

EXAMPLES OF BRONZE WORKMANSHIP.

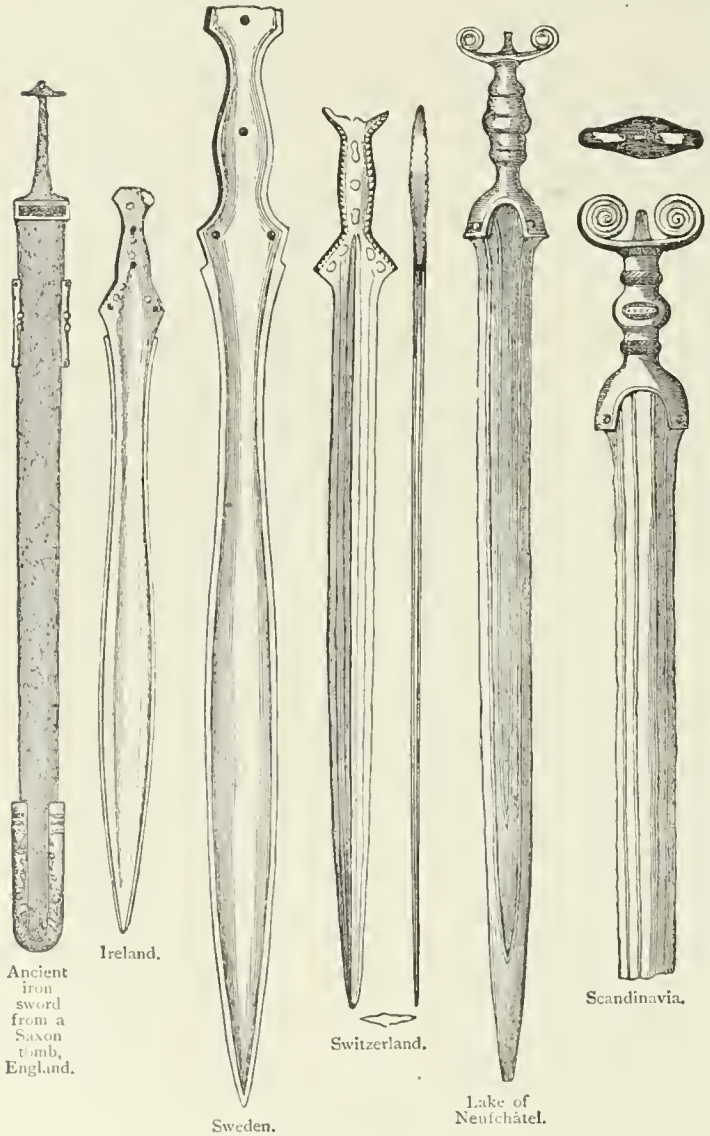
After a long period in bronze-making and bronze-using, the prehistoric tribes, or perhaps we should now say nations, pass into the age of iron. Iron, except in the form of meteorites, does not exist

The age of iron succeeds the epoch of bronze.

in the native state. For this reason its discovery as a metal happens late in the history of man. The extraction of iron from the ore is, moreover, exceedingly difficult even with the powerful appliances of modern metallurgy. The man of antiquity was unable to produce the requisite heat, and even had he been master of an adequate temperature he could not have conjectured by *à priori* reasoning that such a substance as metallic iron might be expected to issue from the rust-colored stone constituting the ore.

Doubtless the discovery was accidental. Indeed, traditions exist to this effect. It has been handed down that a European discovery of iron by smelting occurred in Bohemia within the historical period. However this may be, we have unmistakable proofs that somewhere in the early dawn of the Græco-Italic development in Southern Europe the discovery of the process of extracting iron was made and the fabrication of implements therefrom begun. The Greeks, at least of the post-Homeric epoch, had a soldiery bearing iron weapons, and it appears that the Romans from the first faint limnings of tradition armed themselves, for both offense and defense, with the same heavy and enduring metal. In short, the age of iron is, roughly speaking, the age of authentic history. Though the ancient Egyptians were unacquainted with iron, and though the extent of its use among the Assyrians and Babylonians has not been clearly determined, the fact remains that in general terms the manufacture of iron implements has been a circumstance coincident with the historic development of our race. We are now and have been for some three thousand years in the age of iron, and it would seem that we are

Evolution of ironwork in primeval Europe.



EXAMPLES OF IRON WORKMANSHIP.

destined to continue in the same epoch until by a new evolution we shall pass into the age of aluminum.

This somewhat extended digressive study of the four principal eras of development through which the races of men have passed has been made necessary in order to a clear understanding of the true place of the cave dwellers of Western Europe. They were men of the old stone age. Their implements were all palæolithic. They flourished, or at least lived, in an age before the art of grinding and polishing utensils of stone had been discovered. This is to say that they present *the most primitive type* of mankind with which we are acquainted. Nor is it likely that ethnologists and antiquarians will ever be able to deduce from the prehistoric shadows a form of human life more nearly allied to the life of the lower animals than is that which we are now to examine.

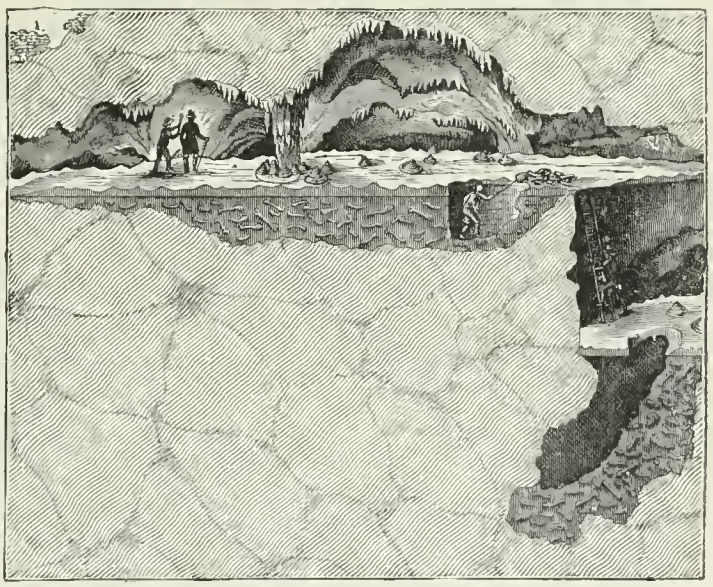
Cave dwellers the most primitive of the European races.

The story of the investigation of the cave dwellings in Europe is full of interest. The care and zeal with which the work has been carried forward will always elicit praise from those who are concerned to know the true story of the human race on the earth. As early as 1825 the attention of antiquaries began to be called to the fact of the mixed remains of men and animals in various caverns which had been explored for other than scientific purposes. It was not, however, until 1833 that the distinguished antiquary, Dr. P. C. Schmerling, of Belgium, forced upon the consideration of scholars the unmistakable lessons which the caves had revealed to him and his colaborers.

Interest of the investigation of the man caverns.

The caverns in question exist in many parts of the Continent and of England. They abound in Southern France and along the borders of Belgium. They are dark grottoes in limestone rock, and seem in nearly all cases to have been selected by the cave men because of the narrowness and defensibility of the openings. In many instances the mouths of the caverns have been found closed by the very stones which the rough inhabitants rolled and pushed into place as a barrier against their enemies. The floors are generally on a lower level than the openings, which fact has led to the accumulation of thick layers of mud and débris on the bottom. Over this collection of earthy materials, mixed as they are with the relics of the human and non-human occupants in former ages, is nearly always spread a layer of that calcareous substance called *stalagmite*, deposited there in the course of centuries

Character of the caves inhabited by primeval man.



MAN CAVERN IN GALEINREUTH, BAVARIA.

by the lime-saturated exudations from the roof of the cavern. This stalagmitic floor, holding its secrets underneath, is generally quite hard, and is in many cases two or three feet in thickness. The cavern here described is typical, but is subject in different localities to considerable modifications in its character and details.

It was such a cave dwelling as this, called the Cavern of Engis, that Dr. Schmerling entered and explored in 1832. It was situated near Liege, at the junction of the Meuse and the Ourthe, in Belgium. The story of the exploration is as heroic as the results were novel and instructive. Schmerling had to be let down into the cavern by a rope tied to a tree outside. He was obliged to slide in order to gain an entrance. Within it was as dark as night. The explorer had to creep from one apartment to another through contracted and dangerous passages. Into these spectral vaults he introduced his workmen. Some held torches while the others worked. The floor of stalagmite was as hard as marble. The philosopher was obliged to stand hour after hour with his feet in the mud while the cold exudations from the roof of the cavern dripped on his head. Finally the stalagmitic crust was broken up and the materials underneath brought to exposure. Everything was done under Schmerling's personal direction, so that no false statement or unfact of any kind should mix with the results.

Exploration of the Engis cavern by Dr. Schmerling.

The results were marvelous. Human skulls and indeed whole skeletons were found in the clay and muck under the floor of stalagmite. And to make the discovery more astounding, the bones of several species of extinct animals were found intermingled with those of men! It was noted, moreover, and established to a demonstration that the human parts and the animal parts were in such juxtaposition and relation as to prove the coïncident lodgment and preservation of the remains. Every fact tending to throw light on the discovery was carefully recorded by Schmerling, and in the following year he published a treatise announcing as a scientific truth the contemporaneous existence of man and the mammoth in Western Europe.

Carefulness of the investigation; the deductions.

A second digression is here desirable, relating in this instance to some changes which have taken place in the fauna of the continent since the close of the pliocene era of geology. It appears that certain transformations have occurred in the climate of Europe which have made the country untenable to several species of animals formerly prevalent therein. About seventeen varieties of mammals have disappeared since the old stone age. These embrace several species of heavy pachyderms and quite a number of smaller animals, nearly all of which have their habitat either in the tropics or in regions much more tropical than any part of Europe. That these species formerly abounded on the continent is clearly demonstrable. That they could not possibly exist under present climatic conditions is also true; from which it seems clearly established that a great change toward frigid conditions has taken place in the European countries. This change, doubtless, is the very fact which has caused the extinction of the animals referred to and the perpetuation of the varieties now existing.[1]

Significance of the transformations of European climate.

[1] The theory of the existence of a tropical condition in the northern hemisphere in the age *preceding* the last glacial epoch of our planet may now be considered as a demonstrated scientific truth. See the discussion of the subject, p. *ante* 57.

The seventeen species of mammalia which have thus been extinguished by the vicissitude of climate are as follows: The cave bear; a second variety called *Ursus priscus*, or the ancient bear; the cave hyena; the cave lion; the mammoth; another species of the genus *Elephas*, called the old elephant; the hairy rhinoceros; two other species of rhinoceros; the hippopotamus; the musk ox; the Irish elk; the wild horse; the glutton; the reindeer; the aurochs, or European bison; and the urus, or primitive ox. It is thought by naturalists that some of the species here enumerated have perpetuated themselves in deflected varieties of the original until the present, but the rest are manifestly and indubitably extinct. Yet all of these animals were prevalent in the old stone age, and it is the testimony of the cave dwelling that man was their contemporary and competitor for occupancy.

Species of extinct animals associated with man.

Dr. Schmerling continued his investigations in other limestone caverns and with the same general results. In at least four or five of the caves near Liege he found unmistakable proofs that they had been used for dwellings in the prehistoric ages. Evidences of the manner of life of the primitive barbarians of Western Europe accumulated, and fact was added to fact in illustration of the conditions under which man contended with the laws of his environment before the first peoples of the Aryan race had found a footing in the countries this side of the Danube and the Rhine.

Evidence cumulative respecting the character of primeval man.

Before proceeding to note the particular contents of the various European cave dwellings, and to elucidate their significance, it will be proper to enumerate some of the principal caverns which have been explored. The Belgian government finally undertook the work begun by Schmerling, and in 1867 sent out a party of scientists under direction of the naturalist, Dupont, to carry forward the investigation. Several other caves like that of Engis were examined in the same region and the contents transmitted to museums. The cavern of Chaleux yielded in addition to its animal relics a vast number of implements, all belonging to the old stone age. That of Furfooz was almost equally rich in prehistoric materials. The cave called Frou du Frontal contained parts of thirteen skeletons. The opening of this vault was still closed with the block of stone which the cave men had used to barricade the entrance. The grotto of Aurignac, in the south of France, yielded seventeen prehistoric skeletons, but these were unfortunately lost through the ignorance of the mayor of the city. In the department of Dordogne, in Southwestern France, a number of cave dwellings have been explored with results confirmatory of those attained elsewhere; and in connection with these caverns the additional interesting fact was noted that artificial chambers connected with the natural vaults in the limestone had been excavated and used by the primitive occupants. In 1858 the philosopher, Schaafhausen, gave to the public an account of the discoveries recently made in the limestone cavern of Neanderthal, between Düsseldorf and Elberfeld, including a description of one of the most remarkable prehistoric skulls which scholars have had the fortune to examine.

Sketch of the most important cave dwellings of Europe.

Turning to England, one of the most important of the caverns formerly inhabited by men is that known as Kent's Hole, near Torquay, in Devonshire.

Exploration of the man caverns of England.

This was first explored by the scholar, MacEnery, in the year 1825. No published account of the results, however, was made until 1859, when the relics were classified by Mr. Vivian. In 1862, a remarkable hyena den called Wokey Hole, near Wells, was explored and described by William Boyd Dawkins. Meanwhile the naturalist, Goodwin-Austen, had reëxamined the cavern of Kent's Hole, and given the results in a memoir to the Geological Society. In 1858 Dr. Falconer informed the same learned body of the interesting discoveries made by himself in a cave dwelling at Brixham, also in Devonshire; and afterward a Professor Ramsay explored the grotto and verified the former conclusions respecting its contents.

GROTTO AND ROCK SHELTER OF BRUNIQUEL—AN ABODE OF PRIMEVAL MAN.
Drawn by Riou.

Explorations were next carried into distant parts. In the grotto of Maccagnone, in Sicily, Dr. Falconer made discoveries in the same general line with those already recorded. The peculiarity in this instance was that many of the relics of men and animals were found agglutinated to the *top*, or roof, of the cavern, where they had seemingly been held in place by the action of water until

Peculiar finds in the grotto of Maccagnone.

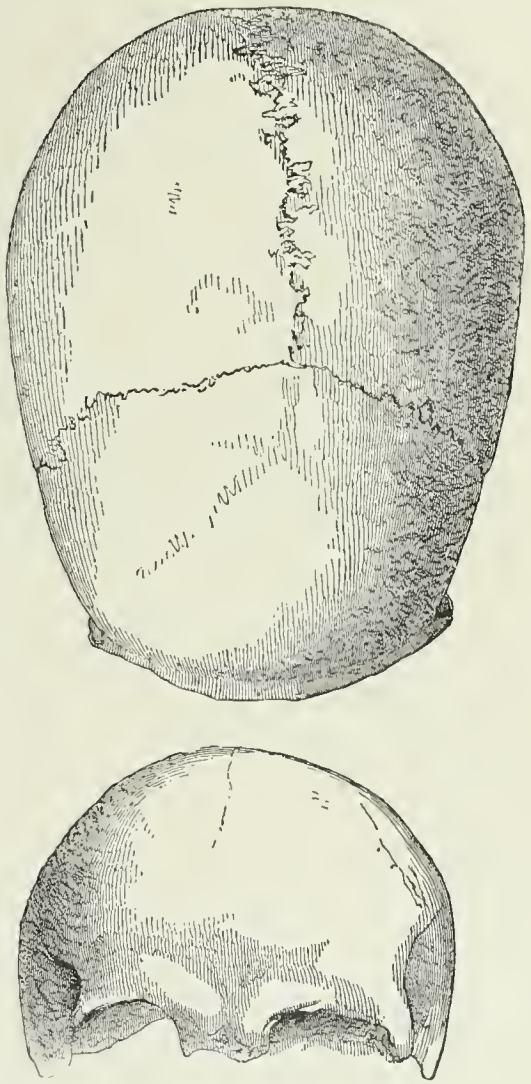
the precipitation of lime had cemented them to the ceiling! Some interesting caves have been explored at Gibraltar with results similar to those enumerated above.

Illustrations of cave life drawn from three sources.

It is thus that antiquaries and scholars have become acquainted with the conditions under which the cave dwellers of the prehistoric age passed their existence. It will be seen at a glance that the illustrations of the life of these primitive barbarians are drawn first from the character of the human remains themselves; secondly, from our knowledge of the animals with the bones of which the human relics are found intermingled; and thirdly, from the character of the implements and utensils which the cave men left with their own skeletons in the clay beds of the caverns.—Let us look then, first, at the remains of the cave men themselves and compare these human relics of a prehistoric epoch and people with the like parts of existing races.

Characteristics and suggestions of the Engis skull.

One of the most interesting skulls which has come to us from the time of the cave dwellers is that found by Dr. Schmerling in the limestone cavern of Engis. A cast of this skull has been made and duplicates distributed to the leading museums of the world, and the most skillful naturalists have passed upon its character. On the whole, it is of smaller capacity and less symmetrical development than the average cranium of the civilized man of to-day. It is narrower in the forehead, and gives evident indications of weakness in other respects. But still it is of better capacity and much less forbidding than might be expected in a case of a prehistoric inhabitant of a cavern. The skull plate is not especially thick, and that part which is supposed to indicate animality is not more protuberant than in the case of many skulls of existing races. Professor Huxley has candidly remarked that "It is a fair average human skull, which might have belonged to a philosopher,

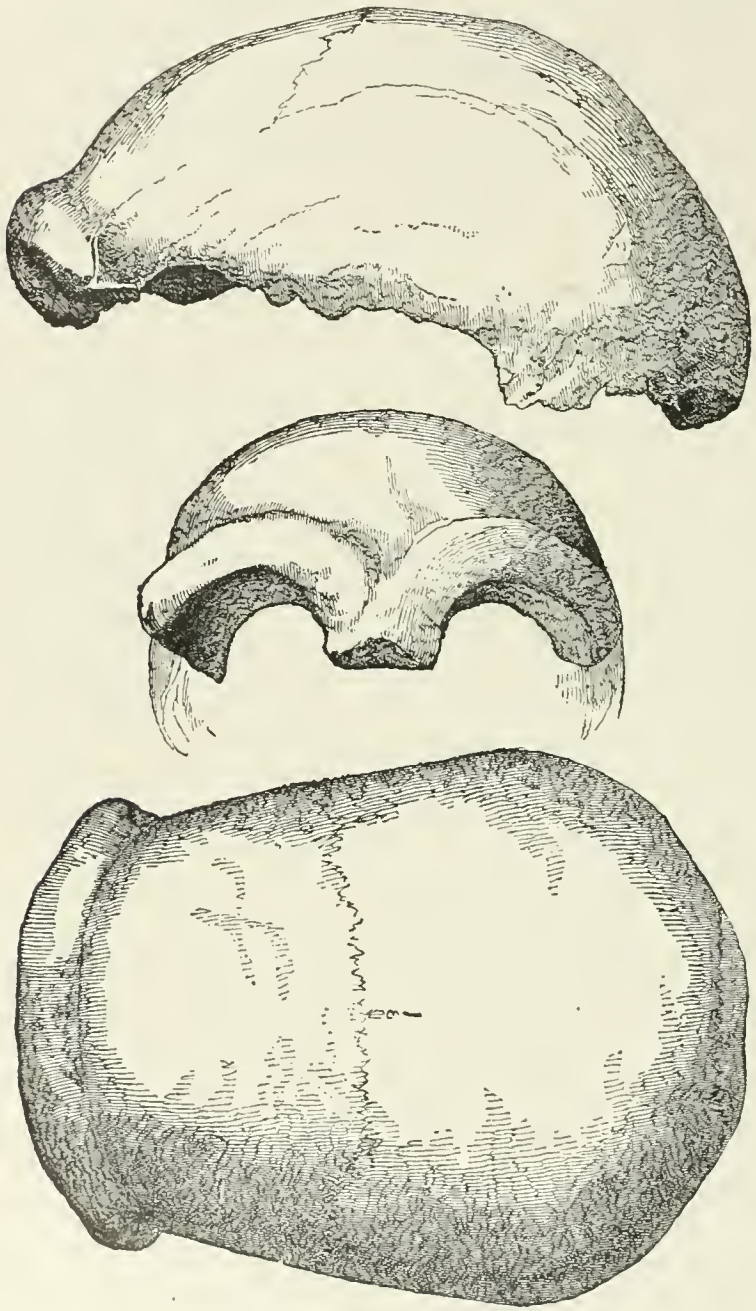


THE ENGIS SKULL.

or might have contained the thoughtless brains of a savage."

Very different from this, however, is the skull described by Schaafhausen, which was taken from the cave of Neanderthal, near Düsseldorf, in Rhenish Prussia. The latter is so exceedingly

gross in its form and structure as to suggest, almost with the force of demonstration, a type of life but little above that of the beasts of the field. The skull is almost as flat and thick and receeding as that of a gorilla. No man of any existing race, even the most barbarous, has a skull at all comparable with the Neanderthal in its small capacity, outward-sloping occiput, and great thickness of bone. The accompanying cut of an authentic cast will sufficiently illustrate the character of the skull under consideration.



THE NEANDERTHAL SKULL.

Peculiar animality indicated by the Neanderthal skull.

It is not needed in this connection to enter into details respecting the character of the other parts of the human skeletons which have been found in the cave dwellings of Europe. It is sufficient to note the fact that in general these remains depart somewhat from the highly developed and symmetrical forms of living types of men, and verge off unmistakably in some particulars toward the forms of the lower animals. The arms, for instance, of the cave men were longer than those of existing races. The hands also shared the elongation of the humerus and ulna, and appear to have had less of that lateral flexibility which distinguishes the human hand from the fore paw of the chimpanzee. The animal quality is again illustrated in the size and shape of the under jaws of the cave men. There is in this respect a consid-

Other features of the skeletons of the cave dwellers.

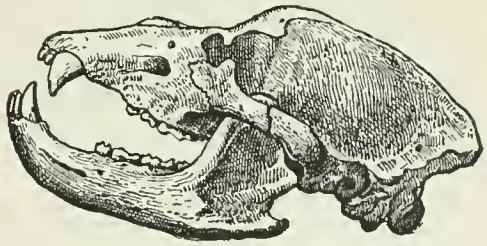
erable departure from the square, light, and symmetrical lower jaw of existing races. The teeth also of the cave dweller were, as a rule, larger and more canine than the human teeth of the present. The shape and armature of the mouth were more distinctly carnivorous than could be found in the case of any living species of men, and the bones of the body were, as a rule, stronger and redder and armed with higher processes for the attachment of muscles than we find in skeletons of the historical period. On the whole, the indications derived from the bones of the cave dwellers point convincingly to a type and manner of life considerably more approximated to the mere animal existence of the creatures with which these primitive savages contended than to the highly organized bodies and refined characteristics of living men.

Extinct animals associated with man; the cave bear.

Something has already been said of the character and place of the animals with which the prehistoric man was associated in Western Europe. It is now no longer doubted that he was a companion of the mammoth and the hairy rhinoceros at a time when these huge pachyderms still prevailed in the country. Of all the animal remains with which the bones and implements of man are associated in the cave dwellings the most numerous are those of the cave bear. Perhaps not a single cavern in which the relics of human life have been found has been explored without the discovery of the bones of this extinct animal. He seems to have roamed everywhere in the west of Europe, and to have had a special liking for those limestone vaults which the cave men chose for their dwellings. The bones of this *Ursus spelæus*, or cave bear, indicate that the possessor was sometimes killed and eaten by the cave men, who dropped the inedible parts on the cavern floor. But in other instances the bear seems to have died a natural death in the cavern which had been inhabited in the same period by men.[1]

Cave hyena and cave lion; their distribution.

The second of the extinct animals with which the cave man was most associated was the cave hyena. The bones of this creature, mixed with those of man and with palæolithic implements, are plentifully distributed in the caverns which have been above described. The animal in question did not differ very greatly from the spotted hyena of Africa and Asia, and his habits, doubtless, were of the same kind as those of his prototypes.



HEAD OF CAVE BEAR.

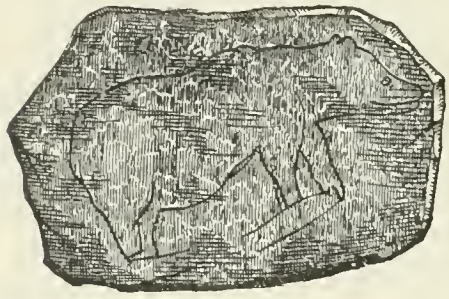
The cave lion, scientifically called *Felis spelæa*, is the third of the animals which were associated with the prehistoric man. This beast was much larger and stronger than modern lions, if we except the great beasts of Africa. The ancient animal was even more strongly discriminated from the tiger than is any existing variety of lion. The primitive beast roamed freely in France, in Ger-

[1] It is almost certain that the cave bear of the old stone age was the progenitor of the common brown bear of Europe and America. The skeleton of *Ursus spelæus* is somewhat larger and stronger than the bone-frame of his descendants, and his jaws and teeth had specific characteristics marking him as a different, or at least more primitive, type of animal; but in other respects the naturalist finds little to discriminate the ursus of the cavern from his modern representatives—little except the size.

many, in Italy, and in Sicily, and his remains have been known and classified since the seventeenth century. It is thought that the bones of the same animal have been found at Natchez, on the Mississippi, a fact which would seem to indicate a very wide distribution of this creature. Other varieties of the genus Felis also existed in the epoch of the cave dwellers, and their remains are found associated with those of men.

Reference has already been made to the contemporaneous existence of man and the mammoth. This creature seems to have been distributed over the whole of North America and the continent of Europe from Land's End to Siberia.

Great pachyderms; restoration of Elephas primigenius.



SKETCH OF CAVE BEAR, DRAWN ON A STONE FOUND IN THE CAVE OF MASSET.

From the north the mammoth crossed the Alps, and his remains are found as far south as Rome. But no traces of this pachyderm have been found south of the Pyrenees or in the Mediterranean islands. As a rule, and for very obvious reasons, the bones of the mammoth are infrequently found in the cave dwellings of Western Europe. As already noted, the entrance to these abodes were generally too narrow to admit so huge a beast; but there are instances in which the bones of man and the relics of the mammoth have been washed by water into a contemporaneous deposit in the bottom of caverns. In other localities the skeletons of the mammoth or parts thereof have been found in close and frequent association with the skeletons of prehistoric men, and in such localities the age of the deposit can nearly always be determined by the presence of old stone implements. No fact in natural history seems to be better established than the coëxistence of man and this so-called *Elephas primigenius* in most of the European countries. The story of the discovery of the hairy mammoth imbedded in a mass of frozen soil in Siberia is well known. At the beginning of the century this remarkable find was brought to the knowledge of scientific men, and a portion of the animal recovered from the dogs and wild beasts to which it had been abandoned. The mammoth was a huge pachyderm of the elephant order, with a dark colored skin, covered with reddish wool, mixed with long black bristles stronger and coarser than horsehair. A restoration, from strictly scientific data, of this great beast of primeval Europe has been effected by Professor Henry A. Ward, of the United States, and doubtless the monstrous effigy thus produced fitly represents the animal as he was in the days of the cave men of Western Europe.

The bones of the hairy rhinoceros are found in the caverns in juxtaposition with those of men. But like those of the mammoth, the locality best suited to such association of human and non-human relics are the drift formations and gravel beds of the open country. The remains of the musk ox, or more properly the musk sheep, now limited in its habitat to arctic America and Siberia, are also found in union with the relics of the prehistoric inhabitants of the Continent, and even of England. Bones of this animal have been discovered

Other animal remains found with those of man.

in Kent, on the banks of the Severn, and in the gravel beds of Avon.

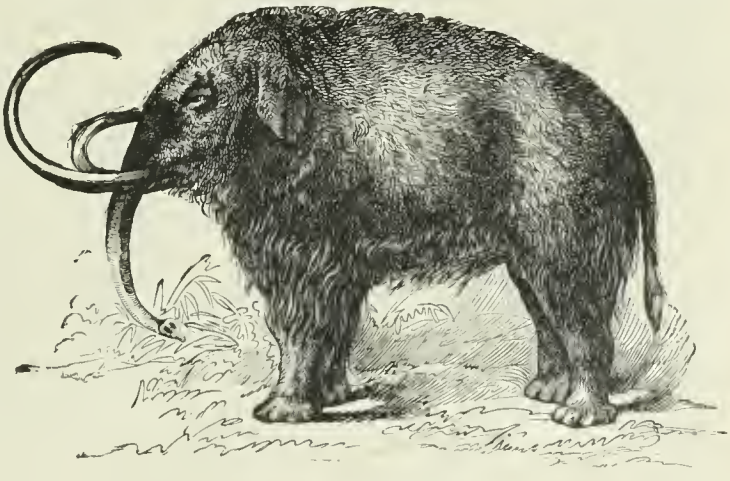
The hippopotamus also, that is, an extinct variety of the species, prevails within the human epoch, and the relics of this animal are associated with those of the cave dwellers. In at least four caverns in England bones of the ancient hippopotamus have been found. The caves of Durdham Down, Kirkdale, Kent's Hole, and Raven's Cliff, in Gower, have all yielded specimens of this extinct beast of the post-pliocene era.

The reindeer was also contemporary with the prehistoric tribes in the west of Europe. He belonged to the age of bronze. At the present this animal ranges far to the north, being wellnigh limited in his habitat to Siberia and Lapland. In America also he beats far up to the arctic regions, but in the central parts of our continent the caribou is thought to be an inflected variety of this same species of rangerine stag that has left his remains with those of primeval man in France and England. In the caverns of Wales more than a thousand horns of the reindeer have been discovered, and traces of his existence are everywhere abundant as far south as the Alps and the Pyrenees. Of the extinct animals that have flourished since the appearance of man only the mammoth and the hairy rhinoceros seem to have been older species than the reindeer. The latter appears to have had great endurance, and as late as the time of the composition of Cæsar's *Gallic War* the animal still roamed in the Hercynian forest—at least such was the information brought to Cæsar. The primitive man captured the reindeer, feasted on his flesh, took his horns for implements, and his hide for a cloak; but the animal was not domesticated in prehistoric times.

The reindeer a former inhabitant of Central Europe.

More noted still as a contemporary of the cave dwellers was the great stag called the Irish elk. This was, perhaps, the most magnificent animal of all that we are here considering. He grew to a stature of more than ten feet, and an existing pair of his antlers measures *eleven feet* from point to point! These tremendous horns were palmated like those of the American moose, and the huge creature dashing about the Irish peat bogs or through the oak woods of Britain must have been terrible, even sublime, in aspect. His remains are frequently found in the peat measures of Ireland and on the Continent, but still more abundantly in the lacustrine shell marl underlying the bog earth of the marsh lands.

Size and characteristics of the Irish elk.



MAMMOTH, RESTORED.

Next in order of these prehistoric animals is the glutton, called in America the wolverene. He appears to have been a contemporary of the creatures

above enumerated, and in many places to have had a particular association with man. But more important by far in such association was the aurochs, or European bison. This animal has been long extinct in France and England, and yet we have the remarkable fact of his survival in a cognate species in

The prehistoric bison of Europe and America.

gravel yields some relic of this heavy prehistoric animal. Oddly enough, his name is omitted from the interesting list which Cæsar has enumerated as inhabiting the Hercynian wood in the time of his invasion. But the tradition of the aurochs is given in the Niebelungen Lied and other ancient documents.

It seems that the extinction of this an-

FEAST DURING THE EPOCH OF THE REINDEER.—Drawn by Emile Bayard.

America. The bison priscus, or old buffalo of America, is now known to be a more ancient variety than the aurochs of Europe, and yet the latter was contemporary with man along with the mammoth and the reindeer. The aurochs was widely distributed. His remains are found in Scotland, England, France, Germany, Denmark, Sweden, Poland, Italy, and Russia. Nearly every bone cave and bed of river-drift

imal is traceable wholly to the aggressions of civilization and not to any vicissitude of climate. The European bison is said to have been seen in Northern Prussia as late as the latter part of the eighteenth century, and it is believed that a precarious existence is still maintained by the species in some uninhabited parts of Western Asia. An interesting episode is furnished in the fact that in

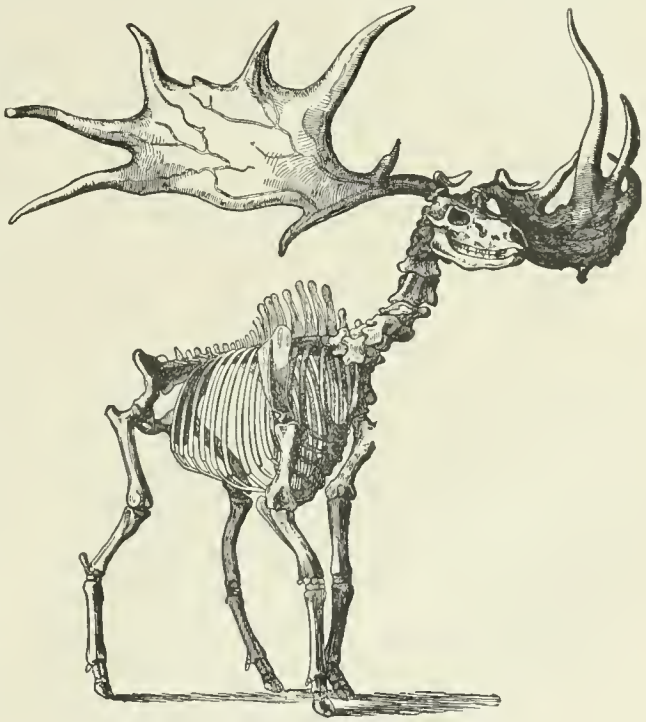
Late extinction of the European buffalo.

the Polish revolution of 1831 a herd of more than seven hundred bisons which had been preserved by the Emperor of Russia in the great forest of Lithuania was attacked by a body of the insurgents, and a hundred and fifteen of them slaughtered. A remnant of this herd exists to the present day in the same forest.

The urus, or primitive ox, seems to have been limited in his range to the European continent. No traces of his existence have been found in America and none in Asia, but remains of the animal are plentifully distributed in England, Scotland, Denmark, France, Germany, and Sweden. Bones of this species have been discovered in Northern Africa. In the museum of Lund a skeleton is preserved, in one of the vertebræ of which a wound, made, as is believed by Professor Nilsson, by a flint weapon, is plainly traceable. Cæsar, in the sixth book of the *Gallic War*, gives a full account of the urus as follows: "Of these animals, there is a third species which are called uri. They are in size only a little inferior to the elephants; in color and appearance and form they are bulls. Great is their strength and great their velocity. Nor do they stand in dread of either man or beast. The inhabitants take and slay them by skillful contrivance and pitfalls." The tradition of the urus is also preserved in the Niebelungen. The species has been like the aurochs, especially persistent, and has only given way before the invincible pressure of civilization. It is said that wandering groups of uri were known in Germany as late as the sixteenth century, and there is little doubt that the wild bulls which ran at large in the neighborhood of London as late as the twelfth century were identical, at least in descent, with the uri of the Continent. Nor would it be possible to say to what extent the blood of the extinct animal courses in the various breeds of cattle at the present time.

Primitive ox of Europe; Cæsar's description.

Thus we see that while some of the



THE IRISH ELK (MEGACEROS HIBERNICUS).

prehistoric animals above enumerated are indubitably extinct, others have in some sense transmitted themselves into the historic era. The mammoth and the hairy rhinoceros long since ceased to exist in the countries which we are now considering. But the cave bear, not unlike the grizzly of the Yuba mountains, has doubtless left reduced varieties of himself to the present time. So also the reindeer, and, as we have

Some prehistoric animals survive in living species.

just seen, the aurochs and the primitive ox. This is to say that if we look at the current of prehistoric animal life in Western Europe, and consider it as a river flowing over a plain and dividing into multifarious streams as it flows, we shall see some of these streams sinking anon into the sand and disappearing forever, while others maintain for a while a straggling and reduced volume until they in turn disappear. A few currents flow still further and are found precariously wandering on the surface even to the present day. The main point to be borne constantly in mind in this connection is that far back in the midst of these branching currents of animal life primeval man held his career as contemporary even with the oldest divisions of the stream.

Disposition of man to domesticate wild animals.

From the earliest appearance of man on the earth, he seems to have had a disposition to subordinate and use the various animals with which he has been associated. According to the sacred writers, he was to have "dominion over the beasts of the field and every creeping thing." Certainly he has shown a disposition to subdue and possess a great number of the wild creatures of his habitat. His success, however, has been but partial. Some of the animals have spurned his control and escaped from him. The struggle for mastery has gone on until an epoch in civilization has been reached in which man has given his energies to the subordination of the forces of nature rather than the forces of animal life.

The disposition to tame the wild creatures has been deflected into another form of activity. The present conflict of man with the animals tends to destroy rather than to domesticate. From the earliest ages of history and tradition, however, some of the living creatures with which man has been associated have been tamed and brought under his control. Even the archæological and inferential sort of history which we have been developing in the preceding pages shows conclusively that in the most primitive condition of human life several of the animals were domesticated and used by primeval man at his will. It is interesting in this connection to note what these domesticated animals were under the dominion of the cave dwellers of Western Europe.

Early date of the practice of domestication.

First of all, the men of the caverns had tamed the dog and associated him closely with their abodes.[1] It appears that wild dogs, to say nothing of wolverenes, abounded in some localities, but as a rule the canine bones which are found associated with those of men are of domesticated animals, and their abodes seem to indicate that the cave man was accompanied by large packs of

The dog the first of the domesticated animals.

[1] It will interest the reader and strengthen his confidence as well to know *how it is* that the naturalist is able to distinguish the bones of a wild animal from those of one domesticated. To the man of science the case is perfectly clear. The characteristics of the wild and the tame skeletons are so well marked as to leave no doubt whatever relative to their respective antecedents. The bone of the animal under domestication becomes smooth, and the channels on the surface through which the veins and arteries and nerves are distributed become so shallow as to be no longer traceable. The processes and spines which nature has provided for muscular attachments are at the same time reduced in height and size, and the whole appearance of the bone surface becomes as distinctly unlike that of the corresponding species of the wild animal as the living aspect of the domesticated variety is unlike the ferocity and vigor of his untamed kinsman. The accompanying cut of the vertebræ of a cow and of the corresponding part from the back of a buffalo will sufficiently illustrate the marked difference in the bone structure of wild and domesticated animals.

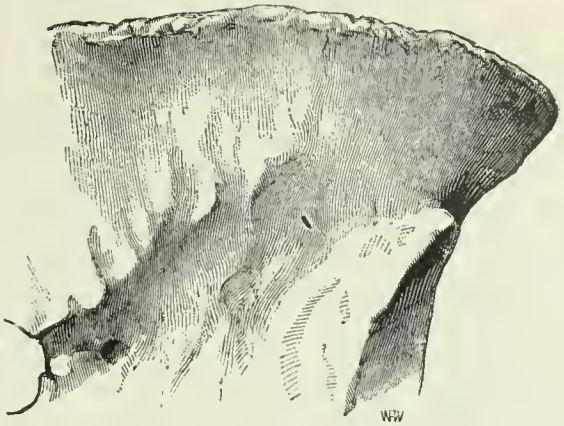
dogs. He used them not only in his contests with wild animals but also for food. The canine bones which are found in the caverns show conclusively that they were broken and sawed open for the marrow in the same manner with the bones of other species. The goat also was almost universally domesticated, but, contrary to what might have been expected, the sheep in many parts was still abroad with the wild animals.

It is doubtful whether any inclosures, properly so called, were used by the cave dwellers, and it appears that sheep, by their native instincts, are less disposed than goats to accept the control and protection of man—more disposed to straggle off and revert to the original type. The same remark may be applied to the cat in contradistinction to the dog. The former, though regarded as a special pet of the human family, seems, after all, to form only a strong local attachment for a given *place*, but very little attachment to human beings. The dog, on the contrary, attaches himself to his master, and not to any particular place. He follows his master to the end of the earth, and cares but little for his own kennel as compared with his master's company. It seems that the goat has much of this same instinct; and for this reason, doubtless, the prehistoric barbarians of Western Europe held the goat almost always in domestication. Though sheep were domesticated and used for both their flesh and their fleeces, they were nevertheless wild animals rather than tame.

Disposition of certain animals to domesticate.

The same classification must be applied to the primitive cattle. It appears that in some places kine were at least partly domesticated, but, as a rule, they ran wild. This may be said also of the swine of the prehistoric age. It is in evidence that droves of domestic pigs were owned and driven from place to place by the barbarians; but for the most part the hog had his native lair in the forest, and was very little subject to domestication. These wild swine were frequently pursued and captured and used for food by the cave men, as is attested by the broken and sawed bones which are left in the caverns and gravel beds. As for the horse, he also ran wild, and it does not appear that in any part of Western Europe, at least in the

Many beasts partly tamed by prehistoric races.



PART OF THE VERTEBRA OF A COW.

CORRESPONDING PART OF VERTEBRA OF THE BISON.

old stone age, this noble animal had been reduced to domestication. But his flesh was eaten in common with that of many other animals.

Eating habits of the aborigines of Western Europe.

As a general fact the cave dwellers were exceedingly carnivorous in their habits. This is the one characteristic of their method of life which discriminates them so strongly from the Aryan household described in the preceding chapter. already remarked, the marrow of the bones was sought with avidity, and scarcely a single fragment was left unexplored for this delicacy. In the rude life of the cavern the bones were simply broken or crushed by some of the heavier stone implements employed by the cave dwellers. But the more approved method was to cut the bone longitudinally with a stone saw. Specimens of this work are plentifully preserved in

HUNT OF THE WILD BOAR.—Drawn by Emile Bayard.

It is doubtful whether by the ruder type of the cave men the soil was cultivated at all. They availed themselves of many vegetable growths, ate masts and roots and wild fruits of the woods, and even devoured the barks of trees; but it does not appear that the rational cultivation of the soil was practiced or even known by these rude barbarians. They lived for the most part on the flesh of animals, and this was generally torn from the skeleton and eaten raw. As nearly all the principal museums of the world. The bones of the ox, the sheep, the goat, the reindeer, the fox, the wolf, and especially of the dog, are found treated in this manner in the débris of the caverns. Nor is there any mistaking the purpose and intent of the barbarians in this work.

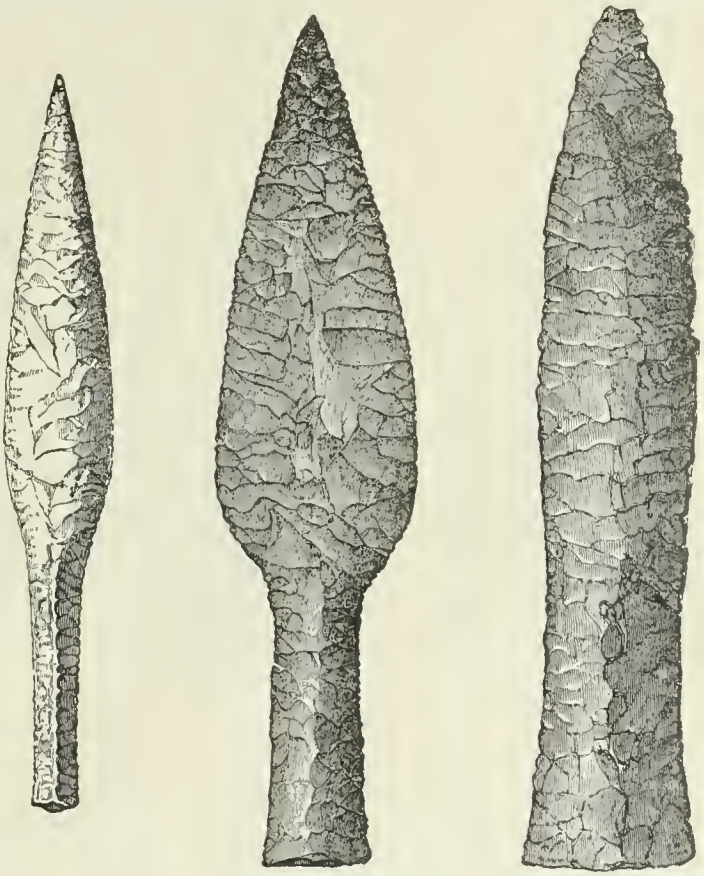
We have now, in our consideration of this archaïc type of man in Western Europe, arrived at the point where the implements and utensils of his household

may be appropriately considered. The one thing to be remembered and repeated with emphasis in this connection is that the cave dwellers flourished in the old stone age. Only in few instances and in peculiar localities does this primeval form of human life seem to have extended upward from the palæolithic into the new stone epoch, and still less frequently into the age of bronze. It must be constantly borne in mind that, on the zoölogical side of this inquiry, the primitive man of the western parts of Europe was allied with the extinct species of animals described in the preceding pages; that in his geological relations he held his career in what is called the post-pliocene, or quaternary period, and that in his archæological relations he was associated with the old stone era. We come, then, to consider some of the details of his implements and household apparatus.

Place of the cave men zoölogically and geologically.

The utensils and weapons of the cave men were made from flint and analogous varieties of stone. They were broken and chipped into form after the rude manner described on a former page. Those who have given little attention to the subject and have seldom visited our museums of archæology can but be astonished at the great abundance of old stone implements which have been recovered from the age which we are here considering. In the museum of Copenhagen, for instance, there were, in the year 1864, one thousand and seventy flint axes and wedges, two hundred and eighty-five broad chisels, two hundred and seventy hollow chisels, three hundred and sixty-five narrow chisels, thirty-three hollow narrow chisels, two hundred and fifty poniards, six hundred and fifty-six lanceheads, one hundred and seventy-one arrowheads,

Extent and variety of prehistoric implements in museums.

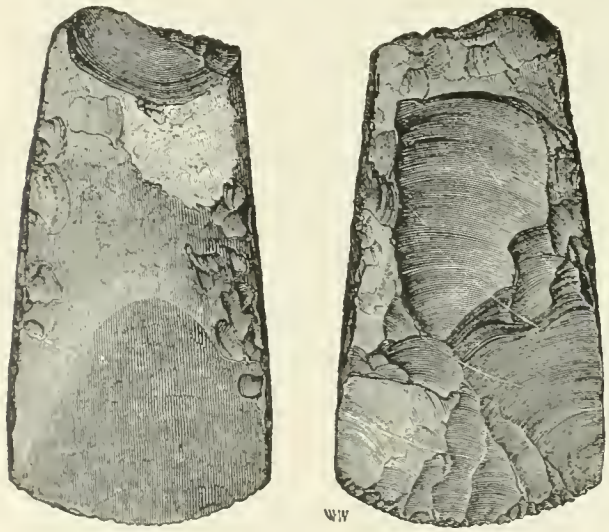


PALÆOLITHIC DAGGERS.

two hundred and five half-moon shaped implements, seven hundred and forty-six pierced axes and ax hammers, three hundred flint flakes, four hundred and eighty-nine sundries, three thousand six hundred and seventy-eight rough stone implements from the shell mounds of Denmark, one hundred and seventy-one bone implements, one hundred and nine other bone articles from

the shell mounds, making in a single museum a total of eight thousand seven hundred and ninety-eight specimens illustrative of the age of stone.

The Danish museums contain an aggregate of about thirty thousand stone implements, and these are but a fragment of the great collections of other countries. The museum of the Royal Irish Academy contains seven hundred flint flakes, five hundred and twelve so-called "celts," or axes, more than four hundred arrowheads, fifty spearheads, seventy-five scrapers and



PALÆOLITHIC AXES FROM THE SHELL MOUNDS.

many sling-stones, hammers, whetstones, grain-crushers, etc. The great museum of Stockholm contains upward of fifteen thousand specimens illustrative of the weaponry and utensils of the age of stone. Indeed, in all parts of the civilized world, in public and in private collections, vast numbers of a still vaster aggregate remaining in the earth of these stone-made relics of the prehistoric times have been gathered, and it is not to be doubted that other museums still more capacious could easily be filled with like materials.

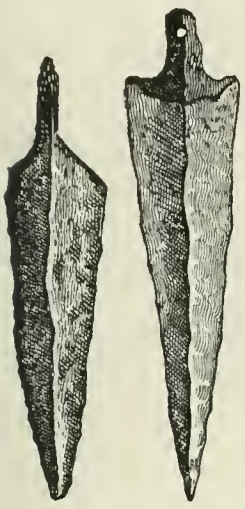
Perhaps the most important single implement used by the primitive inhabitants of Europe was the stone ax. This tool, even from the palæolithic era, had a certain rude approximation in shape and character to the modern ax of steel. But the stone implement was generally fastened to the helve by a much more primitive method than that employed in the case of metallic axes. The stone ax, after having been chipped into proper form from a block of flint, was generally inserted in the limb of a tree, broken or cut off to the proper length. The blade was fastened in the opening by the binding around of strips of rawhide or the tendons of some strong animal. There was great variety in the size and shape of the implement and equally multifarious uses. The barbarian seems to have employed his ax for everything. When we consider the rudeness of the tool and the manner of its mounting, it seems almost incredible that it could have been so effective in the hands of those who used it. It is well known that these prehistoric people cut down large trees, sharpened heavy piles, and accomplished other astonishing feats with their rude stone axes. Doubtless the time required to do such work was considerable, and it is known that in many cases fire was employed to assist the process. The barbarian used his ax, as already indicated, to split or burst the bones of the animals whose flesh he devoured and whose marrow was regarded as a morsel.

Stone axes, and the work accomplished with them.

The cave dwellers and their contemporaries also manufactured and used a great variety of knives. The patterns of these were almost as variable as in the case of modern cutlery. Sometimes

Flint knives, and the manner of their production.

the knife was double, having a blade fixed in either end of the handle. Generally it was single bladed, and in a great many cases had no handle at all. The blade was produced from a flake of flint or obsidian, and was chipped into form after the manner already described. It must ever be a matter of astonishment that the savage man of the prehistoric ages was able to produce such fine effects by the mere breakage and chipping of such material as flint. Next among his implements may be mentioned the chisels which he used and which are also of various patterns—some narrow, some broad, some hollowed along the center of the shaft, and others convex. It was a general peculiarity of these stone implements that the cutting edge was curvilinear, either gibbous or semilunar in shape. This is true of the edges of the axes and chisels and adzes and knives, and indeed nearly all lithic implements and weapons.



FLINT ARROWPOINTS FROM THE BONE CAVERNS.

Perhaps no complete enumeration can be made of the tools and utensils in use among the prehistoric peoples whose manner of life is here delineated. The variety was wellnigh as great as that in the shop of a modern artisan. There were sledges and hammers and saws, wedges and celts, spearheads, arrowheads, javelinpoints, daggers, poniards, many varieties of cutting instruments after the general pattern of the knife, scrapers, picks, many kinds of hatchets, sling-stones, weight-stones for nets and fishing lines, harpoons, awls, lapstones, and an infinity of the so-called flakes. Nearly all the varieties here enumerated can be seen in any ordinary museum of antiquities, and the beholder, by their inspection, can but feel himself drawn near to the prehistoric race of men by whose hands these implements were wielded.

Great variety of prehistoric tools and weapons.

It is not intended in the present work to enter into the details of archæology. It is not even the purpose to give any elaborate account of the slow transformation by which the tribes of the old stone age passed by evolution into the new stone age and thence into the age of bronze. It is sufficient to note that the general manner of life of the cave men and their contemporaries was that of hunters and fishermen, men of the woods and stream. Doubtless it would be improper to speak of the "social system" of a people that had no society at all. The cave dwelling would seem to indicate an exceedingly solitary life. It appears that in the case of the larger caverns quite a band of the barbarians

Manner of life without and within the man caverns.

FINE PALÆOLITHIC ARROWPOINTS.

lived together. The abundance of bones and relics is much greater than we should expect in the case of a single family or even five families in the same abode. Nor should we forget that what we may call the waste of implements would be much less among a people where a single tool was of so great importance than in a modern household where an implement can be immediately replaced.

PREHISTORIC MAN OF THE NEOLITHIC AGE.
Drawn by Emile Bayard.

The care which these people bestowed upon their utensils is well illustrated in the distance to which they were carried in the case of migration. Nothing is more common than to find flint implements and weapons at a distance of hundreds of miles from the quarry whence the material was taken. The man of antiquity sought assiduously for the best quarries and ledges from which to take the materials of his manufacture, and the old pits which the prehistoric folk dug in the chalk beds, in order to get at the layers of flint underneath, are plentifully distributed in parts of England and France. There appear, moreover, to have been seats of manufacture, sometimes in connection with the quarries and sometimes in other places. This fact would indicate a rude sort of commerce in implements. But

over and above this circumstance the fact remains that the barbarians themselves clung to their tools and weapons with great tenacity, carried them to great distances, and only parted with them by the necessities of accident or death.

Care taken of utensils; places of manufacture.

We are thus enabled to form a true concept of the prehistoric man of Western Europe. In stature, he is believed to have been considerably larger than the average man of to-day. His bones have greater length and strength, and his proportions indicate a rather gigantic form. Doubtless he was brutal in appearance, with hair growing low upon his forehead and an animal leer on his features. Whether the day-dawn of the higher sentiments, the nobler aspirations, had as yet arisen in his spirit we can not know. But that he had in him the potency and germ of human greatness, the possibility of light and freedom and knowledge, can not be doubted or denied. He was the gross substratum of that human life which even in the present day is but half-refined from barbarism and half-redeemed from the heavy weight of brute passion and animality.

Stature and personal characteristics of the cave man.

CHAPTER XVII.—LAKE DWELLERS OF SWITZERLAND.

THE delineation of primitive life given in the preceding chapter represents but one of several types of human existence in the prehistoric ages. The men of the caverns were a single branch of the barbarians who inhabited Western Europe in the old stone age. It is not intended in the present work to describe all the aspects of half-savage life which present themselves to the antiquarian and ethnologist, but to discuss only a sufficient number of the primeval tribes and their methods of development to enable the reader to form an adequate idea of the whole. In the current chapter we shall turn to two or three other forms of aboriginal European life, and present them in the light of what is known or reasonably inferred concerning their career. First of all, attention will be called to the lake dwellers of Switzerland and other similar situations.

It must be known that the bodies of fresh water on the European continent have considerably diminished in area and volume since the age of the mammoth and the reindeer. The circumference of all the lakes has contracted, and the surface has sunk to a lower level. The extent of this diminution has been much greater in some localities than in others. The fall of a few feet in the level of a lake will sometimes, owing to the flatness of the shore, expose a considerable area of land that was hitherto submerged, whereas if the shores be precipitous, a fall even of many feet will make no perceptible difference in the position of the water line.

General contraction of the fresh-water areas of Europe.

Both of these conditions have occurred in different localities. In some places around the margin of lakes acres and even square miles of territory are now dry land that were formerly under water.

Character of the debatable margin around lakes.

More frequently this recently exposed strip exists in the form of marshland or bog, but half reclaimed from its ancient submergence. Wherever the lake is situated in a flat, open region, this condition of a fenland border exists to a greater or less extent. Lagoons and marshes, sometimes grown up with trees and sometimes covered with the reeds and grasses peculiar to the region of the bog, will be noted in close proximity to the lake itself, and the observer will readily note that the addition of a few feet to the water level would restore the lake to its primitive borders covering the lowlands.

In other places, particularly in the mountainous regions, the water line of the lakes has had less fluctuation. Here the waters are contained as in a cup of stone, and the rising and sinking of the lake surface has widened and contracted the border line but little. In almost every situation, however, some fluctuation has occurred, and even a single unusual season, whether it be of rain or aridity, will be clearly perceived in the narrower or wider limit of the lake. This is to say that around all of the fresh-water bodies is a debatable shore, of greater or less extent, which has been in turn submerged and uncovered according to the humidity or the dryness of the epoch. More particularly has the gradual recession of all superficial waters into the inner parts of the earth told upon the lakes, especially those of small extent, in reducing their area and depth.

The primitive European tribes, at least that portion of them which we are now to consider, were by instinct and preference led to establish themselves in proximity with great collections of water. The advantages of such situations are obvious. If the water be fresh it furnishes to man one of the prime essentials of his existence and many conveniences. It gives him, moreover, from the depths a multitude of fishes, easy of capture and good for food. If the water be salt, though its direct use by man is impracticable, it nevertheless yields him a great store of shellfish and many valuables besides. We are here to note what was done on the margin of the lakes.

Certain primitive tribes chose the lake shores for residence.

The winter of 1853–54 was one of excessive rigor in Europe, but of small precipitation of rain or snow. This was followed the next summer by a season of unusual drought. Since the year 1674 no parallel had been furnished to the draft which was thus made upon the volume of the lakes and the paucity of the return which nature made thereto. As a result, the level of the mountain lakes in Switzerland fell off many feet, and quite an area of the bottom was exposed as terra firma. It was here that the discoveries were made by the antiquary, Dr. Keller, and other explorers which led to the reconstruction of that type of prehistoric communities called the Lake Dwellings and Villages.

Great subsidence of the Swiss lakes in 1853-54.

In different ages and in different quarters of the world men have frequently adopted the plan of constructing their abodes above the surface of the water near the shore. The plan is to build a platform, supported by different methods, and on these to rear the huts in which the people lived. Between the platform and the shore communication is easily effected by some narrow structure which is defensible. In the fifth chapter of the book called *Terpsichore*, in Herodotus, we have the following paragraph descriptive of such dwelling places. The author is describing the manners and customs of the

Situation of the lake dwellings; account of Herodotus.

ancient Pæonians: "Their dwellings are contrived after this manner: planks fitted on lofty piles are placed in the middle of the lake, with a narrow entrance from the main land by a single bridge. These piles that support the planks all the citizens anciently placed there at the public charge; but afterward they established a law to the following effect: whenever a man marries, for each wife he sinks three piles, bringing wood from a mountain called Orbelus: but every man has several wives. They live in the following manner: every man has a hut on the planks, in which he dwells, with a trapdoor closely fitted in the planks and leading down to the lake. They tie the young children with a cord round the foot, fearing lest they should fall into the lake beneath. To their horses and beasts of burden they give fish for fodder; of which there is such an abundance that when a man has opened his trapdoor he lets down an empty basket by a cord into the lake, and, after waiting a short time, draws it up full of fish."

But we have no occasion to seek for evidence in the ancient world of the existence of such structures as are here ascribed to the Pæonians. Dwellings over the water are constructed and inhabited by existing tribes of men. The fishermen on lake Prasias, in European Turkey, build their cottages over the water, and the town of Tcherkask is constructed above the current of the Don. In analogy with such structures we might cite the buildings of the people of India, which, though not over the water, are set on piles several feet above the earth. The same kind of abodes are found in South America and in the East Indian islands. The city of Borneo is so founded and built. The Dyaks have their houses on an elevated platform twenty or thirty feet high, in a long row above the edge of the river, and the floors are so constructed that all refuse and waste materials fall through into the water.

Lake dwellings of various countries in the present age.

Switzerland is a locality specially fitted in its geographical structure for the duplication of the dwellings described above by the Father of History. The lakes in this mountainous region have fluctuated in the manner already described, and it was on the borders of the lake of Zurich that the first important discoveries were made. But at a later date explorations around the marshes of lakes Constance, Geneva, Neufchâtel, Bienne, Morat, Sempach, Inkwyl, Moosseedorf, and others have led to like results. A very ample demonstration has thus been obtained of the manner of life of the primitive lake people. The sites of *more than two hundred settlements* constructed as above over the water have been determined and described. No fewer than twenty prehistoric villages have been found on the shores of lake Bienne; twenty-four along the margin of lake Geneva; thirty-two on lake Constance; and forty-nine on lake Neufchâtel.

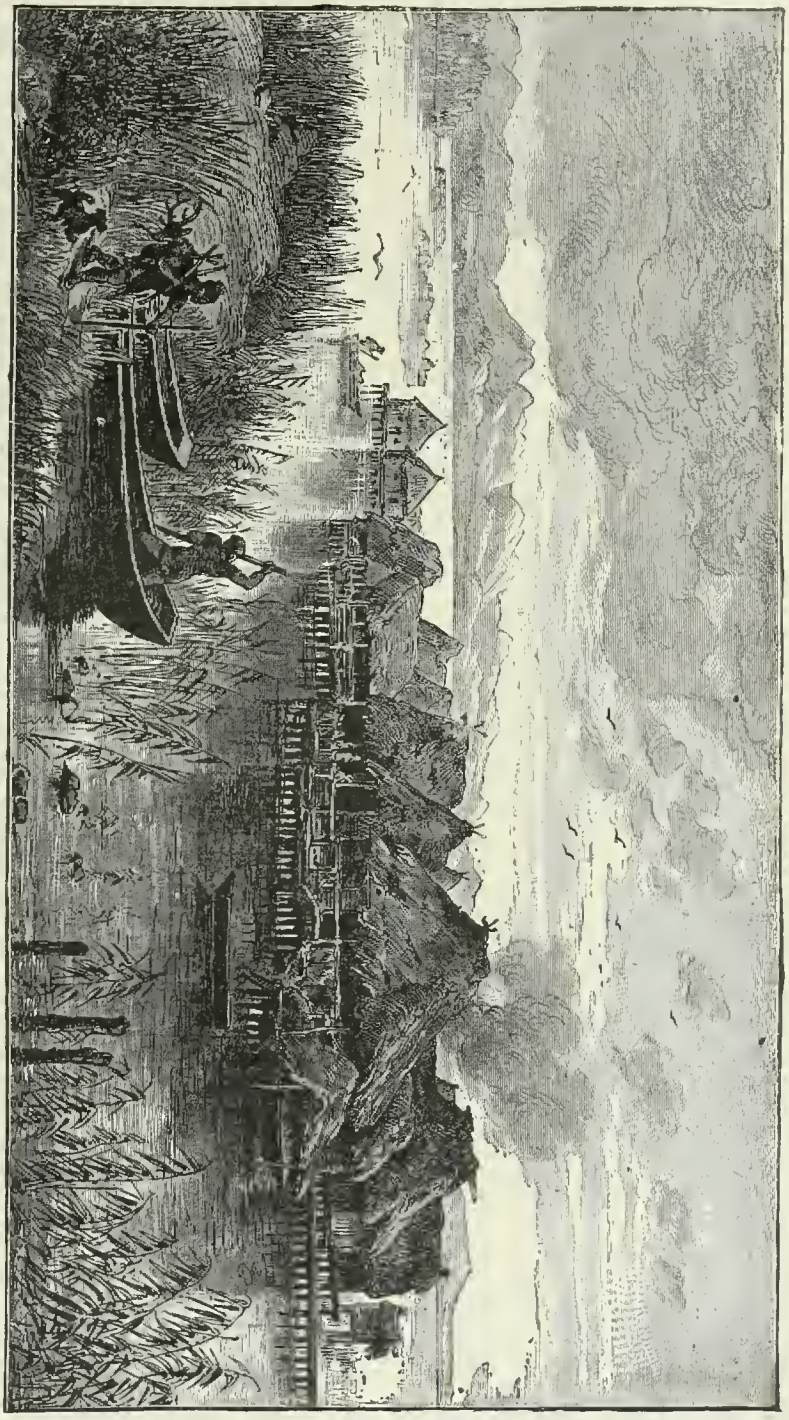
Switzerland favorably situated for such settlements.

It was between Ober-Meilen and Dollikon, on the banks of lake Zurich, that the inhabitants, taking advantage of the low water following the dry season of 1854, extended their gardens down to the margin along the new water line. They built a wall and then filled the space to landward by dredging up mud out of the bottom of the lake on the water side. While doing so they were surprised to draw up vast numbers of piles, or at least the lower ends of the same, which had in some prehistoric

Discoveries on lake Zurich; the crannoges of Ireland.

MODERN LAKE VILLAGE, AT SOWEK.—Drawn by E. Mesples.

epoch been driven down through the water. Along with these sharpened points of trees came up a large variety of deer horn and stone implements of primitive workmanship. The fact that some aboriginal people had inhabited this shore was thus made clear, and scientific explorations, under the direction of Dr. Keller and other antiquaries, soon extended and verified the discoveries.



SWISS LAKE VILLAGE, RESTORED.—Drawn by Riou.

Before proceeding to describe the utensils and weapons revealed in the lake bottoms of Switzerland, it is proper to note the analogous results attained in Ireland. The manner of over-water building is here somewhat different from that practiced by the prehistoric mountaineers. Among the primitive people inhabiting the Irish lake country the plan was to construct a platform on the water, and on this platform to create a sort of artificial island upon which houses and defenses were erected. The name given to this floating residence was *Crannoge*, and the remnants of such structures are easily discoverable to the present time

The crannoges were the strongholds of the primitive Irish chiefs, to which they betook themselves in war, as the Highlanders of a later day to their castles. These prehistoric seats are very rich in implements and weapons and other works of the clans by which they were inhabited. But it is in evidence from the discoveries made in the crannoges that they are of a much later date than the cave dwellings of the Continent or even the lake dwellings of Switzerland. There are instances in which the contents of the Irish crannoge, as for instance that of Dunshaughlin, have been digged up by the wagon load and distributed on the shore to enrich the soil.

Likeness to Highland refugees; the crannoge findings.

In the support of the platform above the water on which the habitations of the Swiss lake people were built, two methods were employed. The first was to cut down trees, lop the branches from the trunks, sharpen one end of the same, and drive them, with many others of like sort, into the water after the manner of a modern pile work. On the upper end of these, above the surface of the lake, the platform was laid and extended according to the demands of the village. The other method was to heap up from the bottom of the lake a sort of rude stone walls, running here and there, rising to the surface, and furnishing support for the platform. But this method was only employed in the more sequestered waters, for the exposure to storms rendered this variety of building precarious.

Methods of supporting the Swiss village platforms.

There is little doubt that the bottom motive in selecting such a site and in building a village or even a single house above the water and at a distance from the bank was the prospect of gaining a vantage against ravenous beasts. In the primeval world this was always a serious question. For long ages the beast had the advantage of the man in the struggle for existence. Heroes whose fame is coëxtensive with the traditions of mankind became such by their successful warfare with wild beasts. Such was Nimrod and such was Hercules. After the hero, the next best thing was an artifice. Building over the water was an artifice. A single flattened trunk reaching from the platform to the shore, or at most a narrow causeway, was easily defended, and bears and wolves would hardly swim to the attack of men.

Fear of wild beasts determined the choice of such sites.

It appears that the lake villages were numerous and extensive. An estimate has been made by the antiquary, Troyon, as to the extent and populations of these settlements. The largest village on lake Geneva appears to have been twelve hundred feet in length and a hundred and fifty feet in breadth. Giving to each hut a diameter of fifteen feet and allowing one half the space to be covered, the village would contain three hundred and eleven houses, and with an estimate of four persons to the cabin, we should have a population in this settlement of twelve hundred and forty-four. The same calculations give for the village on lake Neufchâtel a population of nearly five thousand. Carrying out the same estimates, M. Troyon thinks that the lake population in this region was more than thirty thousand at the time when the villages flourished in the age of stone.

Number and extent of the Swiss lake villages.

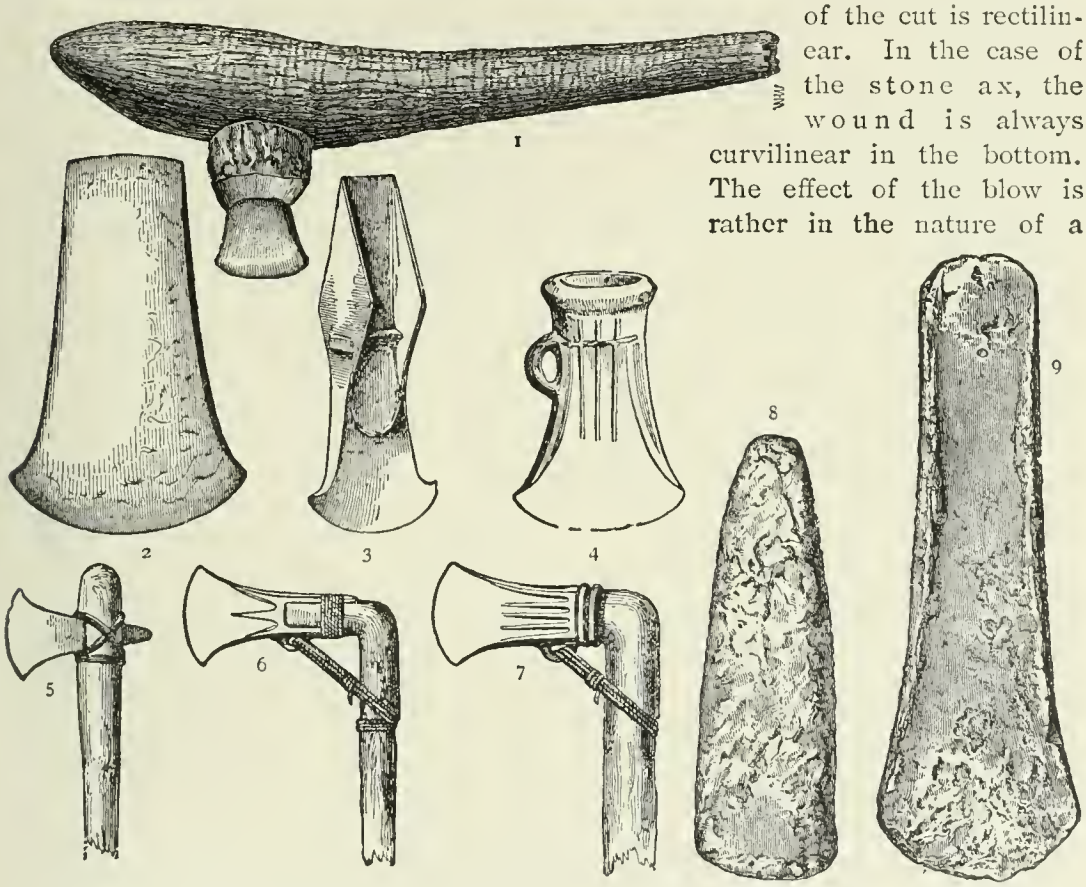
By the backward look we may still, in the mind's eye, observe the process of constructing these lake habitations. The first thing would be, of course, the selection of a suitable site on the water's edge. The shore must be accessible

from the lake and the lake from the shore. A forest must stand near by, from which the trees are felled, with almost infinite labor, by the strokes of stone axes and the assistance of fire. It appears that these primeval men would attack the tree at the base and cut it around as much as possible, and then burn the wounded part down to the solid body. Scraping away the charred portions, they would then cut again, until finally the tree came down. Similar methods were employed in sharpening the trunk. Here also the axes were employed and fire by turns until a rude point was obtained suitable for driving in the mud.

Materials employed in such structures by the builders.

It should be remarked in this connection that the stroke of a stone ax in wood is easily distinguishable from that of the metallic blade. The modern steel ax struck against the side of a tree, even at an angle, makes a straight wound. That is, the bottom of the cut is rectilinear. In the case of the stone ax, the wound is always curvilinear in the bottom. The effect of the blow is rather in the nature of a bruise, the wood where the ax falls being scooped out in a furrow, deeper in the bottom than at the edges of the cut.[1] In nearly all cases the piles supporting the platforms of the Swiss

Distinction in the work done by stone and metallic axes.



AXES OF PREHISTORIC MAN, SHOWING STAGES OF IMPROVEMENT FROM STONE TO BRONZE.
1, Swiss stone ax with handle; 2, copper celt, from Waterford; 3, winged celt, from Ireland; 4, socketed celt, from Ireland; 5, 6, 7, celts with handles of different patterns; 8, bronze ax, from Naples; 9, bronze ax, from Le Puy.

[1] It is claimed that no measure of sharpness which may be imparted to a stone blade will secure a rectilinear cut—like that so easily produced with metallic axes—in the wood struck with such blade at an angle; but the reason for such difference is not clear.

lake dwellings bear the marks of stone and not metallic axes, and in nearly all cases the process of sharpening the trunks has been assisted by the application of fire.

Question of setting the piles; form of the houses.

How it was that the primitive tribes adopting this kind of structure succeeded in raising their piles on end and driving them into the lake has not been ascertained. But the unmistakable evidence furnished by the stumps of the piles themselves shows that they were raised in some way and driven down. The work appears not to have been truly done, as many of the piles stand in the mud at an angle and others appear to have been bent somewhat from their original position by the weight of the superstructure. As to the platform, it was made of split timbers, rudely framed together on the top of the piles, and no doubt tolerably firm for the reception of houses. The latter appear to have been circular in form, made somewhat after the manner of Celtic huts.[1] They were chinked between the cracks with small branches of trees and moss, and were pointed within with mud. As compared with the cave dwellings described in the preceding chapter, it can not be doubted that the lake houses were a great advance, superior in comfort and safety, and not wanting in a certain picturesqueness of situation and aspect.

General character of the finds in connection with lake villages.

We come now to consider the evidences of ancient life which have been discovered in the lake bottoms and peat beds over which the villages were erected. In general, these settlements belong to the old stone age. This is clearly shown by the preponderance of rough stone implements which are found under them. It appears, however, that the lake dwellers continued to hold to their position until progress was made into the new stone age, and even into the age of bronze. In several places it has been demonstrated by the plentiful discovery of utensils and weapons of bronze that the lake villagers had advanced to the manufacture and use of this metal. In any event, all of these stages of development were anterior to the epoch of the Romans, and therefore to the daydawn of history.

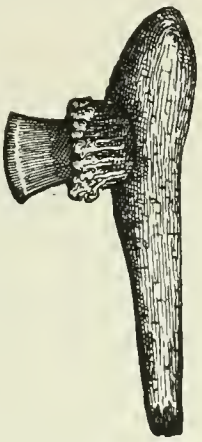
Variety of the implements; the materials employed.

If we glance at the old stone implements found in the margin of the Swiss lakes and in the peat bogs where the over-water villages were built, we find them to be of the same general pattern as those already described in connection with the cave dwellings. It has been noted that the Swiss prehistoric implements, as a general rule, are smaller than those used by the cave men. This is true of the arrowheads, the spearpoints, and the axes. The material employed in the manufacture of these tools and weapons was, for the most part, flint, but in some cases rock crystal. It has been noted that spindle-whirls of earthenware coëxist in the same layer with the rough stone implements. Other evidences of spinning and weaving have been discovered in the same situation, and to this should be added the presence of stone mortars and balls for crushing corn. Sir John Lubbock has recapitulated the articles found under a lake village in the peat measure of Wauwyl as follows: Stone axes, forty-three; flint arrowheads, thirty-six; flakes, two hundred; corn crushers, sixteen; hammers, twenty; whetstones, twenty-six; slingstones, eighty-five; making a total of four hundred and twenty-six articles of stone recovered from a single bed.

[1] See the colored Plate at the beginning of the present book.

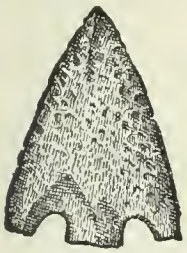
In examining these relics we are again impressed with the fact that rude commercial relations, at least the beginnings of traffic, existed in the age of which we speak. Many of the implements found around the Swiss lakes were brought, at least as to their material, from distant localities. Many of the flint implements are known to have been taken from the quarries of *France!* Some are found that were imported from the shores of the Mediterranean. It is impossible to tell, however, whether these weapons and utensils were carried by trade or by the migration of tribes to the mountain lakes of Switzerland.

Signs in the findings of interchange and commerce.



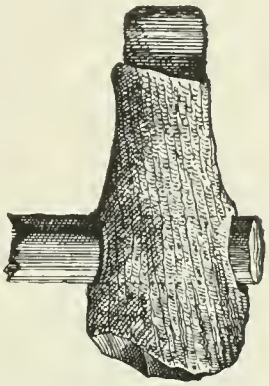
STONE HATCHET WITH SOCKET AND HANDLE.

By examination of the animal remains found under the lake dwellings, the inquirer discovers again the relations which the primitive people here held to the lower orders of life. As a rule, the prehistoric men ate nearly all kinds of animals with which they were associated. The skins of beasts were the principal articles of clothing, and the flesh was invariably stripped away for food. We note in the case of the lake dwellers the same appetite for marrow which we have already noted in the men of the caverns. They picked out of the hollow bones every particle of the contents, and evidently regarded the marrow as the principal delicacy. The harder and better bones were made into implements, but the horns of the deer were the principal resource in this line. From these were made the handles of a great number of other implements, and also picks and awls and scrapers.



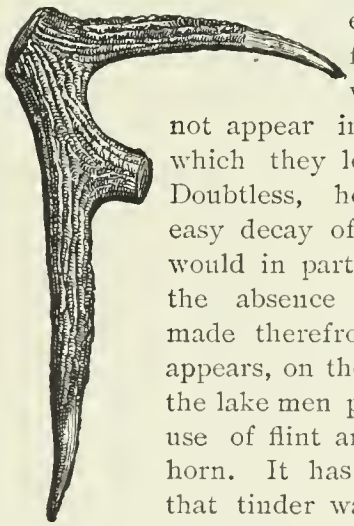
CHIPPED FLINT ARROWHEAD.

In some cases the attempt was made to produce a cutting edge from bone. But from the nature of the substance this could not succeed. Chisels were also attempted, but the material lacked strength and solidity, and the tool so formed could only be applied to the softer substances. The bone scraper was much used in the dressing of hides, in which it appears that all of the primitive Europeans had considerable skill. If the lake dwellers attempted the manufacture of wood, it does not appear in the relics which they left behind. Doubtless, however, the easy decay of wood fiber would in part account for the absence of utensils made therefrom. But it appears, on the whole, that the lake men preferred the use of flint and bone and horn. It has been noted that tinder was employed by the lake villagers in the production of fire.



FLINT HATCHET FITTED WITH STAG'S HORN HANDLE.

Use of bone in the fabrication of tools and weapons.



PICKAX OF STAG'S HORN.

The appearance of broken fragments of pottery in the lake margins and peat beds shows conclusively that the people of the age which we are here consid-

ering understood at least the rudiments of that kind of manufacture. Very few vessels have been discovered whole, but many in pieces. These all indicate the rudest kind of work. The vessels were evidently misshapen and unsymmetrical in design. It is thought that the potter's wheel was unknown. Nor has any evidence of furnace heat been discovered in the imperfect burning to which the fragments seem to have been subjected. Perhaps an open fire produced the highest heat with which these people were acquainted. The forms of a few vases have been determined which, viewed from an artistic point, are clumsy in the last degree. It is noticeable that the earthenware of these villagers is without feet or other support than the unfinished bottom of the vessel. It appears that the utensils were set upon the floor or on the soft earth where there was little danger of breakage.

Pottery of the lake dwellers; rudeness of the relics.

EXTINCT MANUFACTORY OF POTTERY, IN THE GLACIER GARDEN, AT LUCERNE.

Of human remains, strictly so called, only a few have been discovered under the lake villages. Nor might it be reasonably expected that many would be found. It will be seen at a glance that the situation has been much less favorable for the preservation of human skeletons, in whole or in part, than the mud beds under the stalagmite in the cave dwellings. The free action of water, the access of fishes to any bodies that may have dropped into the lake, the movement which would take place under the wave, and the change of temperature, very great as it is in the situation, would account for the destruction and decay of any bodies that might have gone to the bottom through the village platforms. It is likely, moreover, that the lake dwellers had regular methods of sepulture. As has been already seen, they were considerably more advanced in the human evolution than the cave men, and care for the bodies of the dead is one of the symptoms which marks the progressive people from the barbarians.

Scarcity of human remains in the lake margins.

Some remains of men, however, have been found in the mud of the lake margin in such relation with prehistoric relics as to identify them with the age of stone. Perhaps a half dozen skeletons, including the skulls, have been recovered, and from these a fair idea of the stature, form, and characteristics of the lake people have been determined. On the whole, they were not as tall as the Europeans of to-day, but the skeleton does not indicate that strong animal affiliation which we have noted in the men of the cavern. The proportions

Bodily forms of lake dwellers determined from skeletons.

of the lake dwellers were fairly good, and the skull shows a medium capacity. Nor is the configuration specially different from that of the mountaineers of the present time. As to the personal aspect of these people there is nothing better than conjecture to guide us. We know by their manner of life that their intellectual horizon was exceedingly limited; that they had the carnivorous habit, though not in that intense degree peculiar to the cave dwellers; that the social instinct was in some measure developed, as is shown in their aggregation in village communities, and that the beginnings of agriculture among them were sufficient to show the upward tendency toward a higher level of existence.

Animals with which lake villagers were associated.

As in the case of the cave men, much light may be thrown on the life and manners of the people of the lake villages by noting the animals with which they were associated and some productions of the soil which are known to have been economized. A large list of the beasts and birds and fishes peculiar to the era which we are here discussing has been determined by naturalists, and much valuable information therefrom deduced. The prevalent wild animals were the brown bear, the badger, the marten, the wolf, the fox, the wildcat, the beaver, the elk, the urus, the aurochs, the European bison, the stag, the deer, the wild boar, the marsh boar, the polecat. The domestic animals were the horse, the ox, the goat, the sheep, the dog, and the common swine. In the case of the horse, his domestication was but partial, and the demonstration of the existence of tame swine is not complete. It will be noticed at a glance that the wild animals here enumerated are of a somewhat later epoch than those associated with the cave dwellers. The mammoth, the cave bear, the cave hyena seem to have disappeared. Perhaps the Irish elk and the reindeer at no time held this region as a habitat.

Manner of lake life may be drawn from manifest data.

Much may be inferred by a little clear thought relative to the condition of the villagers from the consideration of their domestic animals. Such creatures must be cared for, especially in winter. They must be fed, not to say housed against the rigors of the season. Provisions and shelter would, therefore, be necessary, and people who make such provision and provide such shelter could not be wholly barbarous. Closely allied with this consideration is another drawn from the discovery of various grains that were used by the villagers. Many specimens of charred cereals have been found with other relics of this ancient life. Grains of wheat have been recovered from the finds at Meilan, Moosseedorf, and Wangen. At the last named place the antiquary had the good fortune to discover several bushels of wheat pressed together in a lump, the grains adhering in a mass. The appearance of the wheat is almost identical with that of modern varieties of the same grain. Many specimens of what is known as six-rowed barley have been recovered from like situations, and it will interest the reader to be informed that this variety of cereal was still under cultivation in the primitive days of Greece and Rome. Altogether, three kinds of wheat have been found under the lake dwellings, two varieties of barley, and two of millet. It appears that rye and oats were as yet unknown.

Reverting to the animals of the lake regions in prehistoric times we note two species of wild cattle, namely, the urus and the bison. The former seems to have been reduced to partial domestica-

tion as early as the neolithic period, but no indication of such a fact has been found in the old stone age. The largest of the animals prevalent around the Swiss lakes were these two varieties of wild oxen, the elk and the stag. The rhinoceros had disappeared and the urus had been much reduced from the served in the forests of Germany. It is noticeable that the list of domestic animals has been extended and confirmed. The horse has certainly become, in some measure, the servant of man, and sheep have been more positively reclaimed from the wild condition. It is thus evident that the mere barbarous life of hunters and flesh-eaters was giving way

Deductions from the animal life of the lake-dwelling age.

SWISS LAKE VILLAGE OF THE AGE OF BRONZE.—Drawn by Riou.

great proportions which he bore in the times of the cave men. Looking back from our own point of view we note that elks have not existed in Switzerland during the historical period, though they still maintained an existence in the lowland forests as late as the Roman period. The ibex has also disappeared. The smaller of the wild animals enumerated above still prevail in their ancient habitat, and even the wild boar has been pre- to a higher and more rational mode of existence among these villagers of the Swiss lakes.

It will be of interest to add a few words relative to the birds which came by water or by air to the habitations of the lake men. The golden eagle circled above them. The bones of at least four varieties of hawk have been discovered. Two kinds of owl were known, and two

Species of birds belonging to the same epoch.

varieties of crow. The common starling was present, and the wood pigeon. There were two kinds of heath cock, also the white stork, the ashy heron, the dun grouse, the black coot, two varieties of meu, one kind of swan, one species of goose, two kinds of duck, one kind of diver. Of fishes and reptiles, the remains of as many as ten species have been recovered and identified.

Mention has been made of the finding of the cereals under the lake dwellings.

Significant traces of the prehistoric agricultural life.

It appears from the discoveries that the grains were roasted for food. Beyond this primitive method of preparing kernels, it is known that the lake dwellers used bread. Cakes, hard, flat, circular, unleavened, have been found just as they were prepared for the board at a date more remote than the founding of Rome! Of the methods of cultivation employed in this far time nothing is known. No agricultural implements or apparatus have been recovered, but tools for the preparation of grain, such as mortars and stones for grinding the kernels, are plentiful. Specimens of dried fruit, such as carbonized apples cut into halves or quarters, have been found at both Wangen and on lake Neufchâtel. Such fruits appear to have been of wild varieties, resembling the crab apple of modern times. The vine had not yet made its appearance. The walnut, the cherry, and the damson plum were unknown, but seeds of the wild plum have been discovered. Shells of the hazelnut and beechnut are frequently found in the mud, and sometimes the seeds of the raspberry and blackberry. Beans have been discovered, but only in the later relics of the age of bronze, while peas are found farther back, among the remains of the new stone age. From a consideration of all these elements we are able to make out a tolerably fair schedule of the daily subsistence, the means of supply, and the method of preparation peculiar to the prehistoric villagers of the Swiss lakes.

Bronze hairpin found in Swiss lake.

Bronze pin from a Scotch shell mound.

SPECIMENS OF FINE WORKMANSHIP IN BRONZE.

Mention has already been made of the fact that the lake dwellers continued to hold their situation until their implements of stone were succeeded by the manufacture and use of bronze. The villages belonging to the age of bronze are not so widely distributed as those of the stone period. The former were built, for the most part, on the lakes of Geneva, Neufchâtel, Bienne, and Sempach. In Eastern Switzerland very few

Lake dwellings extend into the age of bronze.

evidences of the age of bronze have been discovered. It appears that for some reason a kind of primitive conservatism prevailed on lake Constance which led to the continuance of stone manufacture long after the introduction of bronze in the western settlements. It is in evidence that other improvements besides the introduction of metal in workmanship appeared in the bronze-making villages. The platforms were more substantially constructed and the houses larger and of a more permanent character. It seems, moreover, that the villages of the age of bronze were built farther from the shore than those of the age of stone. At least the bronze relics are nearly always taken out from a greater depth of water and farther out than the stone implements peculiar to the older age.

By examining the bronze implements their superiority in design and workmanship to those of the periods preceding are quickly noted. The swords, daggers, axes, spearheads, knives, sickles, fishhooks, and articles of personal adornment are all of a pattern which may be called well formed, if not artistic. Bracelets, brooches, and finger rings are found which, though they may hardly be described as beautiful, are not devoid of tastefulness in design and elegance in execution. It is noticeable, moreover, that the supply of implements, weapons, and personal decorations is far more abundant in the case of the bronze-bearing villages than under those of the stone epoch. Many museums have been replenished from the resources here referred to, and a single collection cited by Sir John Lubbock contains four thousand three hundred and forty-six specimens; and it is an evidence of what may be called the personal pride of the villagers of the bronze age that of the list of articles here enumerated more than two thousand are hairpins and rings. In the age of bronze the human race entered upon its career of strength and variety, but did not yet enter upon the career of ambition and vain delusion which it was to pursue in the age of iron.

Evidences of the emergence of the race from barbarism.

CHAPTER XVIII.—COAST PEOPLE OF THE NORTH.

WE now turn to another aspect of primitive life quite different from those discussed in the preceding chapters. We have reconstructed as far as practicable the conditions of the old Aryan housefolk of India; of the cave dwellers of Western Europe, and of the lake dwellers who took advantage of the water surface as a means of protection and convenience. We now come to consider a mode of prehistoric existence which was developed along the seacoast, especially in the northern and northwestern parts of Europe.

Of the forms of primeval life already presented, the most barbarous was that of the cave men; the most elevated, the house people of the East; and the most progressive, the lake dwellers of Switzerland and other like localities. In entering upon a review of the people of the seashore, we shall again be carried back to an exceedingly rude and aboriginal type of human existence, perhaps not

Relative savagery of several prehistoric conditions.

quite so gross, but equally primitive with that of the cave dwellers.

Discovery of the shell dunes on the coast of Denmark.

About the time that the really scientific investigation of archæological remains began in the second quarter of this century, it was noticed that on the coast of Denmark and in other similar situations long, low dunes were thrown up. Sometimes the elevations were nearly circular, sometimes they were ring-shaped, having a crater-like depression in the center. But more frequently they were elongated elevations, from one hundred to three hundred yards in length, perhaps two hundred feet in breadth, and from two to ten feet in height. The situation was along the surf line of the sea, but generally outside of the reach of the tide.

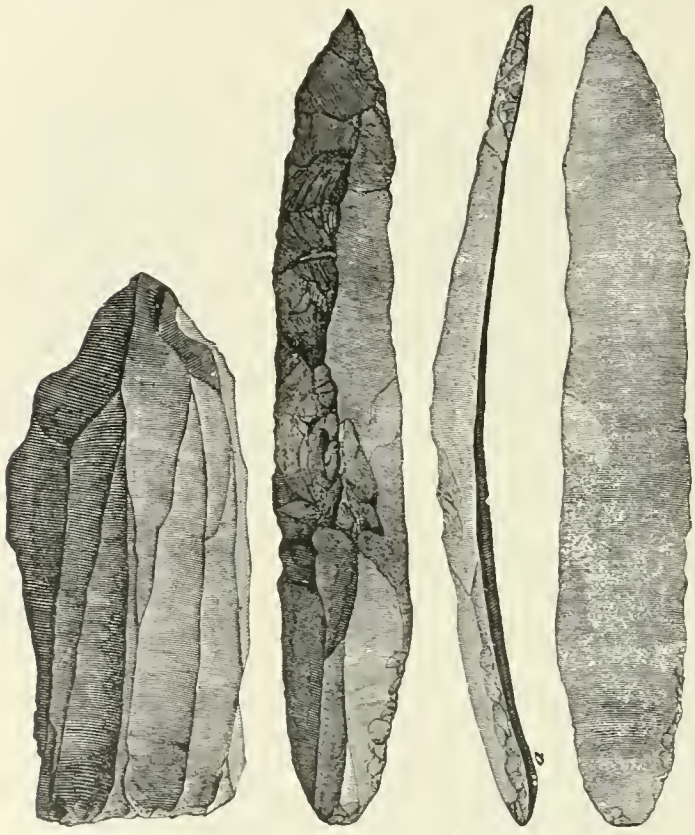
The fact that these dunes and mounds were too far from the surge to have been thrown up by the action of the water first drew the attention of archæologists and naturalists to their peculiarities. It was found that those of the mounds which lay within reach of the tide were made up in part of sand, but the larger portion of the material was shells. In the case of those dunes that were in the higher situations, beyond the reach of the water, they were composed almost entirely of shells, and a very casual examination showed that the mollusks inhabiting them had belonged to another age. Such was the beginning of the discoveries.

Mound contents; investigations of Streenstrup.

The Danish naturalists led the way in examining these strange formations; and it was at once observed that the shells were intermixed with the débris

KITCHEN MIDDENERS AND THEIR DWELLINGS.

of human life. Here, then, was a new class of relics of prehistoric existence, and a new field of inquiry opened before the antiquary. Professor Steenstrup was again in the van in the exploration of the shell mounds. He gave them, in the first place, the name which they have ever since borne, of Kitchen middens. In his own language the word is *Kjökkenmöddings*, which signifies "kitchen refuse heaps." The idea of the learned Dane was that these mounds were the refuse of the food and waste material of a people who had built their huts on the seashore, and had manifestly subsisted for the most part on shellfish. This primary hypothesis of the naturalist was borne out by all subsequent investigations, and it was soon established beyond doubt that a prehistoric people had chosen the shore of this northern sea as the best vantage ground which they could procure in their struggle to preserve life and perpetuate their tribes.



Flint core or nucleus. Flint flakes, Denmark.

WORKMANSHIP OF THE KITCHEN MIDDENERS.

The shell mounds are by no means isolated phenomena. They are rarely found singly, but in groups, covering a considerable extent of coast. This is to say that the primitive people dwelling here lived in aggregations, or villages of huts on the beach. Sometimes a principal mound will appear, and around this others of smaller proportions. The contents are abundant, and the vast heap of shells is in many cases carted away by the inhabitants and used to replenish the soil.

The kitchen middens indicate village communities.

What strikes the beholder in opening one of these mounds is the fact that the *whole contents*, or the materials of the elevation, are the débris of human life. Hardly any merely natural substance is found intermixed with the shells and other refuse of the kitchen and the hut. Doubtless the kitchen was the hut and the hut was the kitchen. In a few instances some gravel and other unmodified natural products are found in thin layers or scattered among the waste of the hovel. But for the most part everything has had its use in the hands and mouths of the primitive tribes inhabiting this coast. The people appear to have subsisted almost exclusively upon oysters and mussels, and to have flung the shells out of the hut until they ac-

The heaps made up of the débris of human life.

cumulated to a depth of several feet. It would seem that in many instances the hut itself would be half buried by the accumulation around, and doubtless the site of the dwelling is the crater which is noticed in a dune here and there.

Character of the kitchen midden tools and utensils.

If we examine the implements and weapons which the coast people lost or broke or cast aside with the other débris of their villages, we shall find them to be of the most primitive pattern and rudest workmanship. They are nearly or quite all of the old stone age, and the method of fracture employed in making them seems to have been less skillful than that of the oldest lake villagers, and fully as rude as the workmanship of the cave men. Great quantities of flint flakes, rough axes, lanceheads, arrow-points, weights for fishing nets, sling-stones, and awls have been recovered from the mounds, and they are, without exception, of the primitive pattern and finish above described. From the shell mound of Meilgaard, which was visited and examined by Sir John Lubbock in person, nineteen axes, a hundred and thirty-nine flint flakes, six bone pins, six horns, four pieces of rude pottery, one stone hammer, and twenty sling-stones were recovered. This mound is merely specimental of scores of others that existed and still exist along the coast of Denmark. These, like the lake villages and the cave dwellings, have contributed thousands of specimens to the European museums, and these have been arranged and classified with respect to their antiquity, so that he that runs may read the story of a prehistoric age.

The extreme simplicity, not to say barbarity, of the method of life of the shell-mound people has already been indicated. As compared with the lake villagers of Switzerland, even of the old stone age, they were far behind. The lake men were acquainted with wheat and barley, and even with the manufacture of bread. But in the shell mounds no traces of grain have been discovered, nor have any relics of vegetables such as men would use for food been found in the débris around the huts. The people seem to have subsisted altogether upon the shellfish which they gathered along the shore, either by digging in the sand with the recession of the tide, or by rude nets which they dragged in shoal water. These mollusks, together with certain birds and wild animals which they were able to capture, constituted the only food of the hut dwellers.

Deduction of a low grade of barbaric life.

The four principal varieties of sea mollusks which the mound builders ate, and which indeed constituted their chief supply, were the oyster, the cockle, the mussel, and the periwinkle. All of these, as is indicated by the shells, were of larger size than those now found on the same coasts. The oyster has wholly disappeared from these waters, and doubtless the other species were of different varieties from those now existing. It must not be understood, however, that the bones of birds and mammals are wanting in the mounds. On the contrary, these are rather plentiful. Professor Steenstrup has estimated that each cubic foot of the shell material contains on the average ten or twelve bones. The mound at Havelse has yielded about three thousand five hundred specimens of the bones of mammals, and more than two hundred of birds. Fish bones other than those of the sea mollusks are also found intermixed in the mounds. The remains of the herring, the dorse, the dab, and the eel have

Nature of the animal remains found in the heaps.

been plentifully recovered in several localities.

Of the relics of mammalia, the most common are of the stag, the roedeer, and the wild boar. In addition to these, bones of the urus, the bear, the dog, the fox, the wolf, the marten, the otter, the porpoise, the seal, the water rat, the beaver, the lynx, the wild cat, the hedgehog, and the mouse have been found in the shell mounds, but sparsely distributed. It will be at once observed from these facts that the animals which the coast people were able to take and kill were generally of the smaller species. The extreme scarcity of the bones of the heavier and fiercer beasts might well beget a doubt as to whether the prehistoric man of this coast dared to meet them in combat at all. Another striking feature revealed by the exploration of the shell mound is that all of the animals here enumerated were wild. It appears very doubtful whether even the dog had become the friend of the dwellers in these seashore huts. At any rate, his bones have the same aspect as those of the creatures of the woods.

Wild beasts known to the kitchen middeners.

DANISH SHELL-MOUND AXES.

The fact of the complete destruction or consumption of the animals with which the shore people came in contact is illustrated by the absence of entire skeletons and the miscellaneous distribution of the bones. It is generally the long bones that are found scattered among the shells. The heads of these have been broken off and reduced to edible conditions, or else have decayed in the course of ages. In all cases the bone shaft has been opened for the marrow; from which it appears that the coast people had the same appetite for this delicacy as did the cave dwellers. From the absence of skeletons, or even large parts thereof, it has been more difficult for naturalists to reconstruct the animals of the Danish coast than of any other situations; but enough has been gathered to justify the foregoing statement relative to the wild creatures with which the shell-mound people were familiar.

Inferences as to the eating habits and customs of the race.

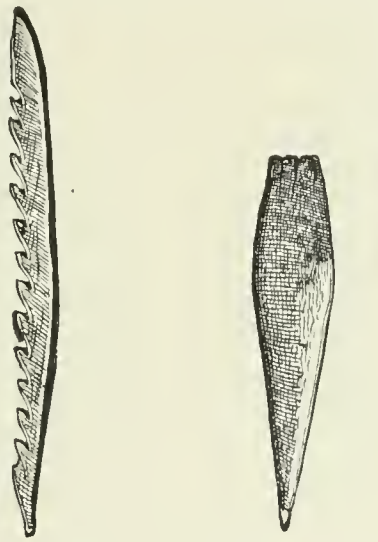
An interesting illustration of the skill of antiquaries in looking into the past is furnished in their method of determining the habits of the prehistoric tribes of Denmark. It is known, for instance, that they were not migratory, but that they held their abode in the same huts the year around. This fact was ascertained from an examination of the bones of the birds upon which these people in part subsisted. Some of these birds, as for instance the singing swan, visit this coast only in the winter. In the month of March they leave for the

Methods of determining the habits of the shell mounders.

South, and return late in November, but the distribution of wild swan bones is frequent in the shell mounds. It appears certain, therefore, that they were taken in winter. Therefore the coast people had their residence here in winter. Again, the horns of stags are cast at certain seasons of the year, and one or two other animal phenomena of like sort have a periodical significance. From the collation of these facts it is proved that the hut dwellers in the localities here described remained in their place throughout the year, and were not merely fishermen of the summer season.

Analogue of the Fuegians; description by Darwin.

We thus see on the Danish coast another type of primitive life quite distinct from those which we have hitherto considered. It is likely, withal, that their manner of existence was not very different from that of certain tribes still living in the extreme of South America. The Terra del Fuegians subsist in a manner very analogous to that ascribed above to the prehistoric tribes of Denmark. They have no domestic animals except the dog. They live almost exclusively on shellfish, and their huts along the coast, if continuing undisturbed for a sufficient period, would doubtless be surrounded by a collection of waste materials almost identical with those of the remote age of the shell-mound people of the North. The great naturalist, Charles Darwin, says of these tribes: "The inhabitants, living chiefly upon shellfish, are obliged constantly to change their place of residence; but they return at intervals to the same spots, as is evident from the pile of old shells, which must often amount to some tons in weight. These heaps can be distinguished at a long distance by the bright green color of certain plants which invariably grow on them. . . . The Fuegian wigwam resembles, in size and dimensions, a haycock. It merely consists of a few broken branches stuck in the ground, and very imperfectly thatched on one side with a few tufts of grass and rushes. . . . Viewing such men, one can hardly make oneself believe they are fellow-creatures and inhabitants of the same world. . . . At night five or six human beings, naked and scarcely protected from the wind and rain of this tempestuous climate, sleep on the wet ground coiled up like animals. Whenever it is low water they must rise to pick shellfish from the rocks; and the women, winter and summer, either dive to collect sea eggs or sit patiently in their canoes, and, with a baited hair line, jerk out small fish. If a seal is killed, or the floating carcass of a putrid whale discovered, it is a feast; such miserable food is assisted by a few tasteless berries and fungi."



Bone harpoon of the Stone Age of Denmark. Arrowhead of reindeer horn.

FINDS FROM THE KITCHEN MIDDENS.

All attempts to construct an authentic chronology for the age of the coast people whose rude life is here depicted are futile. The fact that such modes of

tribal evolution exist in different ages has already been dwelt upon. We have just seen that the Fuegian tribes in the extreme of South America are still in this aboriginal state of development; and we know that in the north of Denmark the shell-mound people had passed away before the beginnings of history. The evidence of this is complete and irrefragable. It is known, moreover, that not only were these tribes prehistoric, but that they held their rude career at a very remote period, even archæologically considered.

Not possible to fix chronology of the shell-mound tribes.

We are able in part to measure the distance of the epoch of the coast men by certain transformations which we know to have taken place in the vegetable kingdom. Since the earliest references in the works of the Roman naturalists the countries of Northern Europe have been heavily covered with a forest of beech. This has been the prevailing growth of these regions since about the time when iron began to be used for implements and weapons. It is well known in the botanical history of the world that the forest of beech is preceded in the plant-cycle of nature by a forest of oak, which in its turn has a long period of duration as the prevalent growth. That is, before the beginnings of the present beech forest of Northern Europe an oak forest prevailed in the same countries for indefinite ages. It is also known that in like manner the pine precedes the oak. That is, the order of nature is, first, so far as we are able to discover, a forest of pine, which at length falls into decrepitude and is succeeded by a forest of oak. This, in its turn, and after a long cycle, grows old, maintains for a while a precarious existence, then gives place to a forest of beech. At the present time the beech forest is growing old, and will at length give place to some other. But we know that the present prevailing woods in Denmark and other regions of the North have existed there since a time long before the age of Pliny—even before the founding of Rome.

Botanical indications of their remote antiquity.

Now an examination of the bones of the birds which were taken and eaten by the coast people and shell-mound era shows conclusively that some of the birds in question were of species which are known to feed upon the berries of the pine tree! So slight a fact is one of many sufficient indications that point unmistakably to the conclusion of the extreme antiquity of the age which we are here considering. It is by this kind of patient research that our knowledge of prehistoric peoples has been widened and developed into its present amplitude; and though it is by no means complete and satisfactory, it is nevertheless sufficient to enlighten the present races inhabiting the earth with respect to the manners and customs of those who slumber in its bosom.

Bird-life bears witness to the same conclusion.

Coïncident with the discoveries which have led to the reconstruction of primitive life in the manner hitherto described, have been others quite analogous. Not only did primeval tribes inhabit the shores of the sea and build thereon their rude huts, scattering around the waste and refuse of their daily life, but others like them in habit and character chose the river banks. It is well known that the currents of rivers vary somewhat in their place and direction. The bed of a running stream is by no means a constant feature in geography. Though in general it traverses a valley, it will be found in one age against the hills on one side, and in the

Over-water habitations established on river banks also.

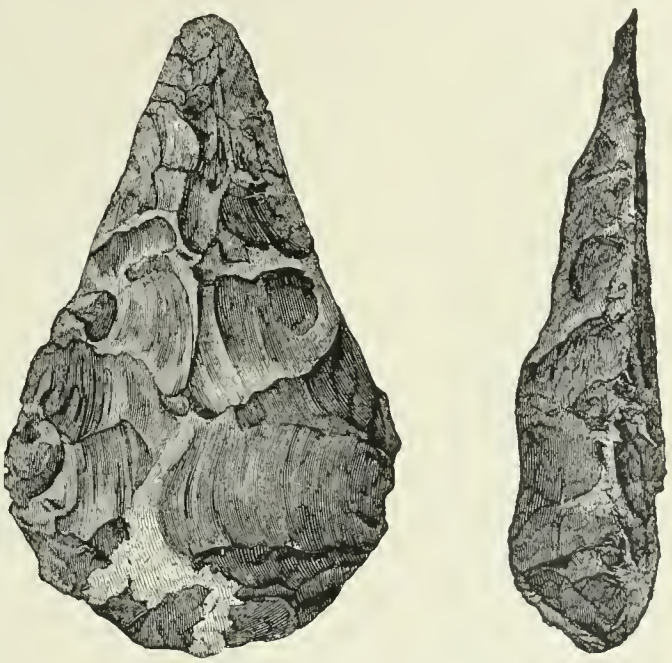
next age on the other. Moreover, the volume of water is much greater in some epochs than in others. As a general fact, the streams and rivers of the early ages of the world were much fuller and stronger than they are to-day. As a world grows older its streams grow weaker, until they finally disappear, and the epoch of life is at an end. The primeval age was one of humidity and plentiful rainfall and full volume in the rivers.

One of the principal concomitant circumstances of the river flow is the formation of sand and gravel. Ledges of rock are broken off and the fragments divided into smaller parts. These are rolled over and over by the stream until they are worn into pebbles and gravel and sand. Vast accumulations of these materials are deposited here and there in the river elbows and bends and curves, in the valley to the right hand and into the left, and especially about the débouchure of the stream near the mouth. While this process is going on the banks of the river on this side and on that are worn away and carried along with the current. Sometimes a whole valley, by a change in the course of the stream, is swept out and deposited somewhere below. These circumstances must be borne in mind if we would apprehend clearly the nature of the discoveries to which attention will now be called.

Physical conditions antecedent to formation of gravel beds.

As early as the beginning of this century implements and weapons were known to have been gathered from river-drift gravel beds, but the significance of such discoveries was unnoticed or ignored. There has been a strange disposition, even on the part of scholars, to maintain old traditionary views about the age of man on the earth. Every new fact tending to show the antiquity of the human race has been resisted and resented as a sort of intrigue against the integrity of existing beliefs.

In geological science this tendency has been especially noticeable. Geologists themselves have for a long time shut their eyes to the most palpable facts, patent to their own senses. It was from this supposable salutary conservatism that the first discoveries of prehistoric relics in the gravel beds, as well as in other situations, were ignored and denied. Those who were determined to maintain the old views respecting the chronology of the earth and its inhabitants put forward all sorts of ridiculous hypotheses to account for that which was unaccountable under their own theory. They even published



PALÆOLITHIC RIVER-DRIFT SPEARHEADS.

Dogmatism confronts geology respecting river-drift findings.

treatises in which it was boldly alleged that the old stone implements which had been found in prehistoric situations were *forgeries* which had been perpetrated against authentic science—that those who were trying to disturb the current beliefs of mankind had *invented* the alleged discoveries to produce a new hypothesis respecting the antiquity of the human race!

Careful examination of the fluvial deposits.

Gradually, however, light dawned and the truth was acknowledged. One naturalist after another became convinced that the weapons and utensils found in the gravel beds were in such relation with geological facts as to compel a belief in their remote antiquity. Many of the men most eminent for learning in Europe visited distant localities and conducted personal explorations in order to establish the truth or falsity of the new view of the antiquity of man. The result has been corroborative of that deduced from other fields of inquiry; and it is now as well known that prehistoric races dwelt in Europe in the time of the mammoth, and wrought rough implements of flint in the post-pliocene era of geology, as it is known that the Assyrians flourished on the Tigris and that Cæsar led Roman legions across the Rhine.

Such findings extend to the British Isles.

The evidences of the existence of primitive tribes along the river valleys of Western Europe have been discovered more abundantly in France than in any other country; but the river banks of England have also yielded their testimony. Before the beginning of the eighteenth century a British weapon had been found in a gravel bed in connection with an elephant's tooth, in a situation described as being "opposite to Black Mary's, near Graye's Inn Lane." This weapon is described as a large black flint, shaped into the figure of a spearpoint. It is known to have been engraved as early as 1715, and a print of it has been preserved in Leland's *Collectanea*. Since the science of antiquities has been developed in our own day, this ancient implement has been shown to be of the same pattern, workmanship, and quality with those found in like situations on the Continent.

River valleys of France especially rich in human relics.

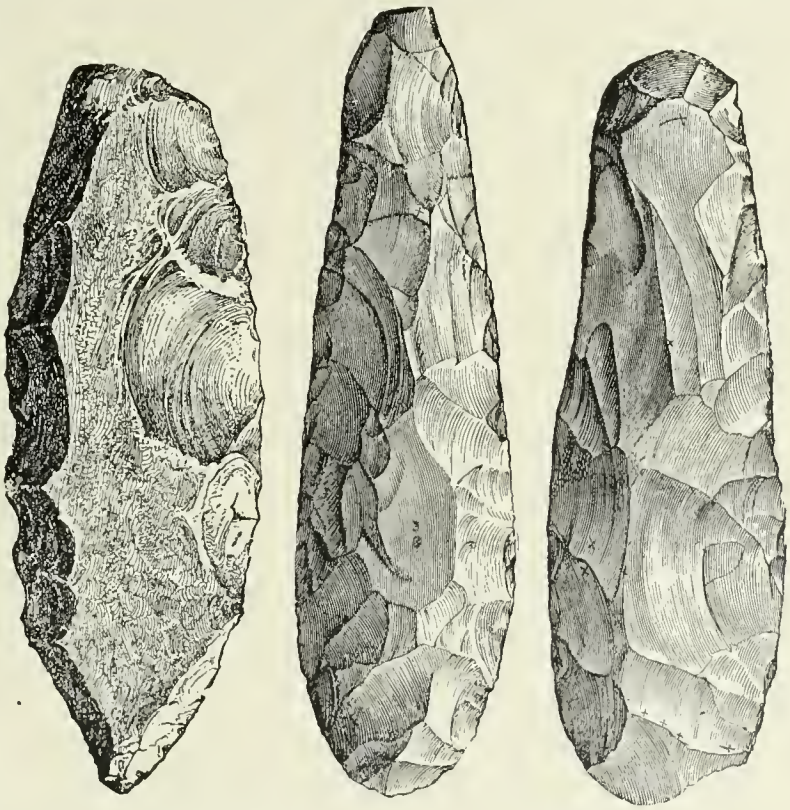
Several of the rivers of France have been specially rich in their yield of prehistoric relics. The principal of these are the Somme, the Seine, and the Oise. In the valley of the first of these streams the explorations have been conducted with scientific skill, and the discoveries made have been fortified as to their verity with all the care and penetration which the best scholars of Europe have been able to bring to the question. It will be of interest in this connection, therefore, to look briefly at the geological character of the Somme valley, and the position in which human relics have been found therein, to the end that the reader may have before him a clear statement of the situation and proof of the results.

Character of the valley and deposits of the Somme.

The discoveries on the Somme have been made for the most part in the neighborhood of Amiens and Abbeville. At these places the valley, from hill to hill, is about a mile in breadth. The main geological formation of the country is chalk. Through this, in the glacial period, the valley of the river was plowed out, and in this wide, low trough the stream still makes its way to the sea. But in the course of ages many secondary formations have taken place in connection with the river. What is properly called the river bottom is filled up in

this neighborhood with a broad, deep bed of peat. This is in some places thirty feet in depth and more than a third of a mile in breadth. In this peat bed, which has been slowly forming for many centuries, at a great depth therein, stone implements and other relics of a prehistoric people have been found. The bones of extinct mammalia are here associated with the works of man in such relation as to establish their contemporaneity.

The peat formation in the Somme valley, however, is one of the newer accretions peculiar to the situation. If the observer take his stand on the low peat bog near the margin of the stream and look to the hills on either side he shall find, at two or three levels in the chalk formation which rises to the height of two or three hundred feet, beds of gravel cropping out of the banks. Through these beds, which were manifestly formed by the river in the older ages of the tertiary epoch, the stream has gradually worked its way down, by attrition, to lower and lower levels, leaving the gravel beds far above the present position of the stream. Above the outcroppings of these beds the old chalky walls which constitute the barriers of the valley are seen rising to the general level of the country above, which is a plateau spreading off in slight undulations. Even the novice in geology is able to perceive that the peat bogs in the bottom of the valley are of recent origin as compared with the old gravel beds lying far above the present level of the river. Yet it is in these gravel beds that the discoveries of some of the most ancient specimens of human workmanship in the world have been made: and the situation in which they have been found has been scanned with so much care, and the explorations conducted with such scientific accuracy, as to preclude all doubt relative to the verity and significance of the facts in question.



PALÆOLITHIC RIVER-DRIFT LANCEHEADS AND AX OF ARCHAÏC PATTERNS.

Time relations of the peat beds to the chalk formations.

Sir Charles Lyell estimates that more than a thousand implements have been taken from the gravel beds in the neighborhood of Amiens. They are all of a common type, and belong to the oldest

epoch known to archæology. They have been classified under three heads, the first of which includes the spearpoints; the second, a sort of almond-shaped implements which appear to have been used as axes for general purposes, such as breaking bones and cracking holes in the ice; and thirdly, flint flakes and arrowheads. All of these are produced by mere fracture, not a single specimen bearing the marks of grinding or polishing. The forms are rude, but the workmanship unmistakably human. In many instances the prehistoric artisan has taken advantage of the natural form of the flint, and merely modified it by breaking *one part* into a cutting form. It has been noted that between the spearheads and the almond-shaped axes several intermediate grades of implements exist, which would seem to show that the end in view was not clearly defined in the minds of the makers. Yet in the midst of the manifest barbarity of the epoch in which these implements were created there has been found a single evidence of taste in certain small globular bodies, with a tubular cavity in the center, which appear to have been used for ornamentation.

Character of the findings in the Amiens deposits.

Notwithstanding the abundant proof that the weapons and tools above described are the relics of human activity in a prehistoric age, very few human remains, properly so called, have been found in the river-drift gravel beds. Only an occasional underjaw, or some other of the harder parts of the frame of man have been recovered in these situations. The bones of animals are much more frequent, and are easily defined; but a moment's reflection will show that these facts would be indicated by right reason. As for the animal remains found in the gravel, they are evidently the fragments of mammals that were drowned by ordinary accident or in times of flood. In such emergencies man is more expert and cautious than the lower orders. Even in his lowest estate he has some measure of foresight, and escapes from a dangerous situation. The gravel pits were not the places of burial. They do not mark the exact sites of human dwellings. They represent materials that were carried to their present place by the action of water. In many cases these materials have been brought from considerable distances. Even an occasional human skeleton given to the river would be tossed and broken and worn, in its course onward, being ground against stones and pebbles into elementary fragments. Moreover, decay does its work. The hardest bone will not survive forever, even under conditions favorable to its preservation.

Reasons for scarcity of human remains in the river-drift.

The paucity of human remains in the gravel beds is in close analogy with the like fact in the shell mounds of Denmark. They, too, have yielded in but rarest instances any actual fragments of the human frame, and it is easy to see that more might be expected from the kitchen middens, with their abundant detritus of man's habitation and localized association with his life, than in the case of river-drift heaped up at long distances from the place where he had his abode.

Shell mounds also have but few of the remains of men.

Not only in the gravel pits of the valley of the Somme, not only in like situations along the banks of the Seine and the Oise, have these relics of the prehistoric life of man been discovered. Like revelations have been made in the river bottoms and sandpits of Great Britain. In a gravel bed at Hoxne, in Suffolk,

Extent of the findings in the gravel beds of England.

specimens of human workmanship like those above described were found as early as the beginning of this century. In similar formations between Guildford and Godalming, flint implements of the old stone age have been found and preserved. It must be borne in mind that the special significance of such discoveries lies in the fact of the association in the gravel beds of these human remains with the bones of the mammoth and other extinct species belonging to the post-tertiary period of geology. In various other localities like revelations have been made by explorations of gravel beds, such, for instance, as those at Icklingham, at Herne Bay, at Abbot's-Langley, and at Green Street Green, in Kent. In a layer of river-drift, near Bedford, bones of the mammoth, the rhinoceros, the hippopotamus, the primitive ox, the horse, and the deer have been found in prehistoric relations with flint implements belonging to the old stone age. In short, the discoveries made in the gravel beds of Great Britain have fully corroborated and verified those made in the valley of the Somme and on other parts of the Continent.

We thus see that along the river valleys of Europe, at a time before the incoming of the first Aryan tribes, primeval races had possession of the country in various parts, and had begun those rude activities out of which the civilized condition was ultimately to spring. The relics described in these last paragraphs are of the most primitive pattern and workmanship. They indicate, indeed, the very first emergence of men from the state of absolute nature and barbarity. The tool-making and tool-using instinct marks, perhaps, the very earliest stages of human development. Whatever may have been the origin of man in these western parts of Europe, we see him, in these far prehistoric times, either an absolute savage or a barbarian, but slightly elevated above the savage state. Perhaps if our knowledge were more complete we should be able to delineate many other circumstances relative to these hard beginnings of civilized life in Europe. The future may still contribute something to our further enlightenment relative to the habits and manners of prehistoric peoples, but for the present we must remain satisfied with an approximate view of their condition.

Deductions respecting the races of the river-drift epoch.

CHAPTER XIX.—MEN OF THE TUMULI.

BEFORE dismissing the subject of the prehistoric life of man on the continent of Europe, still another field of inquiry remains to be considered. In all parts of the European countries, from the Baltic to the Mediterranean and from the British Isles to the Ural mountains, another class of facts, bearing unmistakable evidence of the ancient activities of men, are plentifully distributed. These are the mounds which the tribes builded, in burial and for other purposes, generally called Tumuli: standing stone structures of several varieties, known as Menhirs, Cromlechs, and Dolmens; barrows, camps, fortifications, dykes, and perhaps altars of sacrifice, besides many other kinds of rude

Tumuli and other memorials of primeval man in Europe.

architecture and memorials. Such remains, hardly of sufficient dignity to be known as ruins, are found not only in Europe but everywhere in the world.

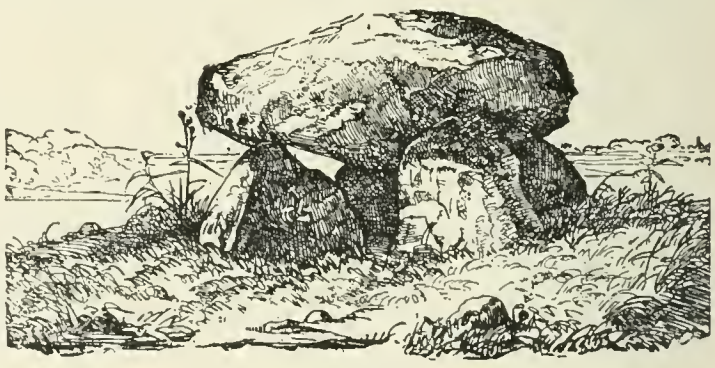
MENHIR, AT CROISIE, FRANCE.

Abundance of such remains throughout the world.

Perhaps no country, great or small, is without such manifest evidences and illustrations of the long dead activities of races and tribes unknown to history. Everywere this substratum of human life, more aboriginal than the aborigines, existed. Traces of it are found on every hand. America, as well as the older lands, abounds in astonishing proofs of nations that existed here, even in strength, between whom and the Indian races that held the continent on its opening to civilization as wide a space of time and character exists as that between the rudest of the Red men and their Saxon conquerors. The mound builders have been abroad; and the long, serpentine mole of earth, or conical hill, of artificial construction, standing here and there in the civilized countries of to-day, bear mute, but everlasting testimony of the ancient and undiscoverable peoples who have gone down to dust.

It is said by Sir John Lubbock that in the Orkney islands more than a thousand of these tumuli and stone heaps are found. In the Danish peninsula the number is still greater, and it would be safe to say that in America more than ten thousand such monuments of prehistoric times exist. The variety exhibited in these relics of a past age is almost as great as their number. Perhaps a majority of all were intended as monuments to the dead, but the details are different, and many volumes could not contain an elaborate description of all. We know from history that even from the daydawn of authentic story men were disposed to mark the resting place of the dead with a trophy. Pillars were set up as the tangible evidence of important transactions. In general, every crisis in life, as well as its termination, demanded a testimonial. It is said in the Assyrian annals that Semiramis buried her husband under a mound of earth. A stone heap was made over the tomb of the father of Œdipus. In the heroic age the building of mounds over the dead was the custom of the time. Patroclus, friend of the crested Achilles, was buried under a tumulus a hundred feet in height; and it has been reported in tradition that Alyattes, father of Crœsus, had a stone-and-earthen tomb more than a mile in circumference.

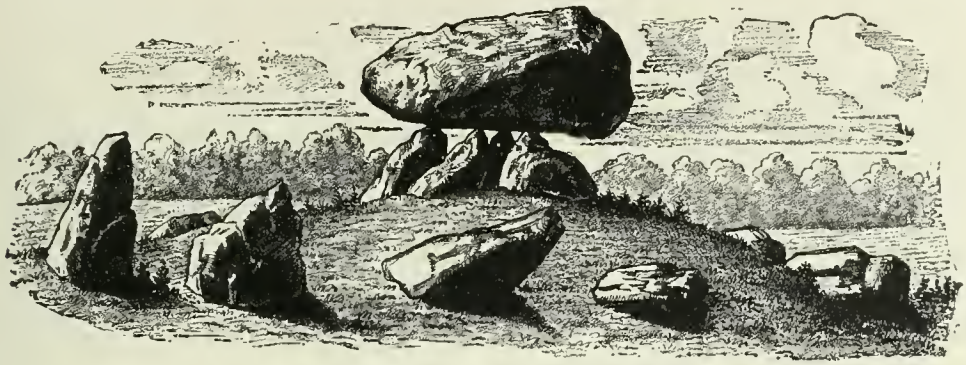
Meaning of the tumuli and stone monuments.



DANISH DOLMEN.

The mounds of which we are here to speak belong to a remoter and ruder age than that of the Trojan War or the conquest of Canaan by the Hebrews. And yet they are not of so great antiquity as those prehistoric memorials which we have examined in the preceding chapter. In general, the tumuli of Europe were built in the age of bronze, and therefore are posterior by a long epoch to the times of the cave dwellers and coast people. This is plainly evidenced in the utensils and weapons which are recovered from the mounds, and which are almost invariably of bronze material. The workmanship, moreover, is of that half-elegant design and execution which belong to an age subsequent, by many centuries, even to the neolithic, or new stone, epoch. It now remains for us to examine, at least casually, some of the existing monuments belonging to the age of the mound builders in Western Europe.

The mounds generally belong to the age of bronze.



CROMLECH OF HALSKOV, DENMARK.

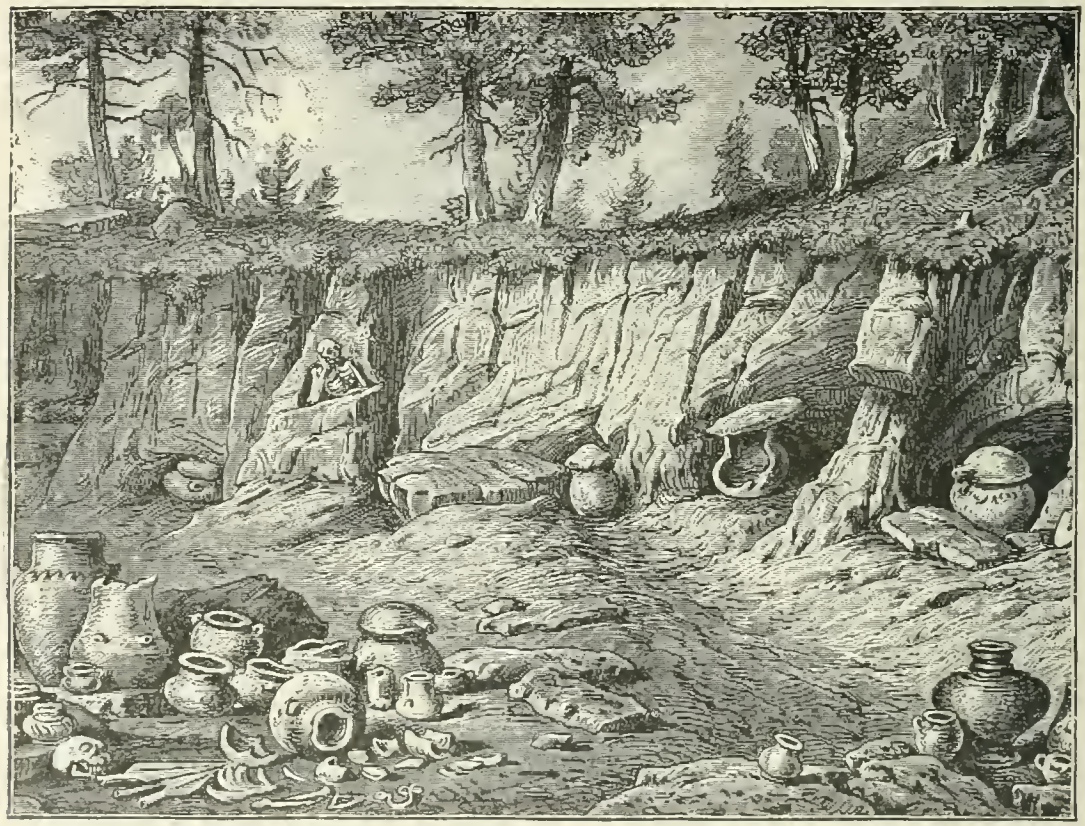
One of the most striking of these memorials is the great megalithic ruin known by the name of Stonehenge, situated in Salisbury Plain, Wiltshire, England. It is the most striking relic of its kind in the world, and has been many times described by travelers and antiquaries. It consists of two great circles of upright stones, one exterior to the other. The outer circle is about three hundred feet in circumference, and the stones in this row are as much as sixteen feet in height and six feet in diameter. On the tops of the rude pillars are laid other stones, horizontally. The inner circle is nine feet distant from the outer. The stones composing it are of smaller dimensions than the others, and are in the native condition, while those of the outer circle have been

Ruin of Stonehenge; its aspect and traditions.

DANISH TUMULUS.

roughly hewn. The capstones also bear the marks of having been rudely cut into their present shape.

Originally the outer colonnade contained thirty of these great pillars, with their capstones, or imposts. Only seventeen of them now remain in position. The inner circle consisted at first of forty pillars, only a part of which are now standing. Within the inner circle another series of pillars, oval in character, and originally nineteen in number, are found, which rise in height toward the center. Around the outside rim was drawn a moat and a rampart about three hundred and seventy yards in circumference. On the northeast of the great circle and running out for a distance of about six hundred yards, there are evidences of approach to the structure. Traces of smaller avenues are also to be found, and in the vicinity of the ruin are various stones which seem to have constituted originally a part of the general design. The whole aspect of the ruin as seen to-day is weird and spectral in the last degree, and the beholder can but be impressed with the strangeness, as well as the antiquity of the monument before him.

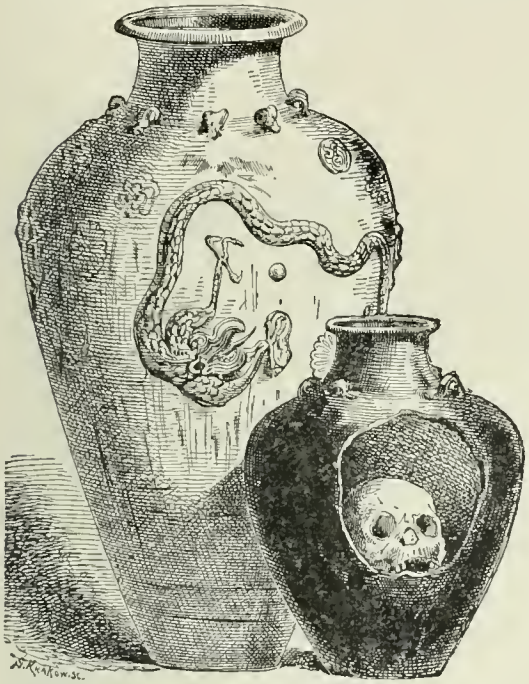


PREHISTORIC GRAVEYARD OF QUATERNARY PERIOD, NEAR LITTAI, IN CARNIOLA, AUSTRIA.

Stonehenge has long been a fertile topic in tradition. The oldest story of all is that given by Nennius, in the ninth century. He declares that the structure was erected by Aurelianus Ambrosius, in memory of four hundred British chieftains who were slain there by Hengist and his Saxon barbarians, in 472. At

Stories of Nennius and Cambrensis.

the close of the twelfth century, Giraldus Cambrensis, another annalist, tells a long story of a great pile of stones called the Giant's Dance, anciently found



BURIAL URNS (ENLARGED FROM PRECEDING CUT).

in Ireland. He narrates that the stones in question were brought to Ireland by a company of Titans out of Africa, who set them up on the plains of Kildare, not far from the castle of Naas. "These stones," continues the story-teller, "Aurelianus Ambrosius, King of the Britons, procured Merlin, by supernatural means, to bring from Ireland into Britain. And that he might leave some famous monument of so great a treason to future ages, in the same order and art as they stood formerly, set them up where the flower of the British nation fell by the cutthroat practice of the Saxons, and where, under the pretence of peace, the ill-secured youth of the kingdom, by murderous designs, were slain."

This story happily illustrates the compass and authenticity of mediæval history. It is well known that the pillars composing the ruin of Stonehenge were taken from stone quarries in the neighborhood, so that no African giants were needed to bring them across the sea. It is also well established by an examination of the mounds in the vicinity that the structure belongs to a period not only earlier than the invasion of Hengist and his Saxon marauders, but long anterior to the conquest by the Romans at the beginning of our era. It is true that no mention is made of Stonehenge, by name, in the Latin authors, but Hecatæus, a Greek historian, who flourished at Miletus about 550 B. C., describes a magnificent cir-

Authenticity of mediæval history illustrated hereby.

VIEW OF STONEHENGE.

cular temple, situated in what he calls "The island of the Hyperboreans, over against Celtica," and the description is of a kind to warrant the conclusion that the edifice in question was no other than Stonehenge.

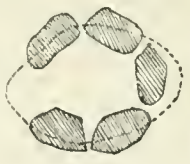
Clustered around this great ruin of prehistoric times are many tumuli, containing the dead and the relics which were buried with them. No fewer than three hundred burial mounds are found within a radius of three miles from the stone pillars marking the site of what was doubtless a primitive temple. From this it would appear that the whole area round about was an ancient cemetery, with some sort of barbaric temple in the center. The tumuli are manifestly tombs. In every case, on opening one of these mounds, the remains of the dead are found. In the great majority of cases the interment has been by cremation, and the evidences show that the manner of sepulture was identical with that generally employed in the age of bronze.

Extent of burial mounds in connection with Stonehenge.

GROUND PLAN OF DANISH CROMLECH.

If we open one of the tumuli—and hundreds of them have been explored—we shall find invariably the remains of one or more human beings. Here again we discover that difference of instinct in method which has always characterized the doings of men. The dead are placed in two postures, one sitting and the other prone, after the manner employed in modern burial. There seem to have been pains taken in the adjustment of the body in a posture befitting repose; and in determining what this should be, some of the prehistoric tribes chose one position and some another. The same variety has been noticed in the case of our Indian aborigines in America, many of whom arrange the bodies of the dead in a sitting posture. In the prehistoric burial mounds which we are now considering, utensils and food were placed about the body as if to serve the dead in the land of the hereafter. It is here that the best revelation of the manner of life peculiar to these people has been made, and the best evidence afforded of the epoch to which they belonged.

Positions of the primeval dead in sepulture.

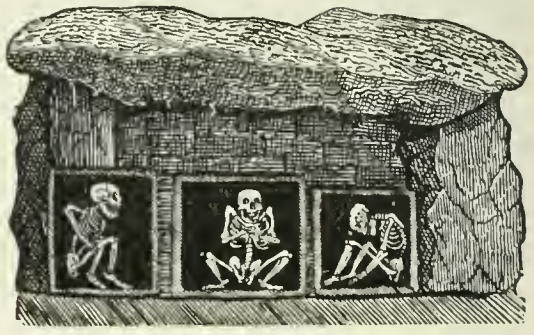


GROUND PLAN OF DANISH DOLMEN.

SEPULCHRAL STONE CIRCLE.

As already said, the implements exhumed from the tumuli are almost invariably of bronze. In a few instances iron weapons have been discovered, but it has been invariably found on closer scrutiny that the same have resulted from a subsequent burial in an old grave. Not a single instance is known of the recovery from a tumulus, either in Western France or Great Britian, of implements or other relics belonging to the period

The mounds belong certainly to the age of bronze.



POSITION OF SKELETONS IN A TOMB OF THE STONE AGE.

of the Roman ascendency, and in only a few cases have the discoveries carried the antiquary back to a period more remote than that of the age of bronze.

We may for a moment consider the facts before us from a higher point of view. The tumuli of the British Isles are only one of several kinds of receptacle for the prehistoric dead. The palæolithic and neolithic ages, as well as the age of bronze, had their burial places, funerals, and rude theories of death. Barbarism developed into several forms of burial method according to the locality and the situation. The manner of disposing of the dead was, indeed, one of the most striking features of the barbaric life. It would appear that from the earliest emergence of man into the conscious life the fact of death impressed the living more seriously than any other phenomenon whatsoever. This led, even in the lowest stages of barbarism, to the institution of rites and ceremonies connected with the final putting away of the body. It was one of the points at which the primitive tribes easily diverged in their customs and methods. There was from the first a contest of belief as to the best manner of disposing of the dead. One plan was to reduce the body to ashes, and another was to preserve it in some situation where it might be protected from disturbance and, we might say, sacrilege; for we may well believe that among the primal instincts of savages one of the first of those sentiments which tend to the elevation of mankind was respect for the body.

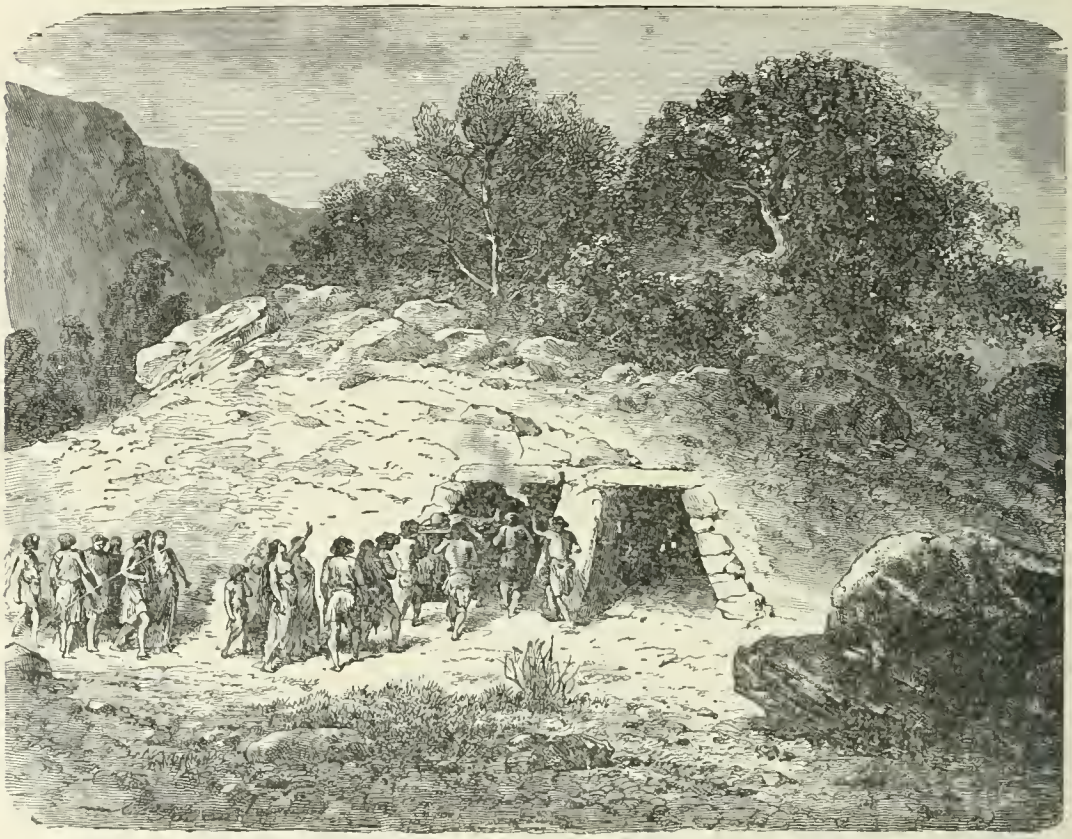
Diverse methods of races respecting death and burial.

FUNERAL IN THE PALÆOLITHIC AGE.—Drawn by Emile Bayard.

Throughout primitive Europe the evidences of aboriginal burial are discoverable in hundreds of localities. These have been studied with diligence by antiquaries, and the results of the inquiry generalized. We are able to distinguish the older places of sepulture from the newer—the palæolithic cavern from the more recent neolithic burial place, and still more distinctly from the burial places of the age of bronze. The conditions of savage life in the respective periods are sufficiently well known to furnish the materials for the reconstruction of that primeval half-savage society which prevailed for many ages.

Burial grounds of different ages may be distinguished.

It was the custom of the tribesmen when one of their number died to assemble at the scene of death and prepare for the funeral. Generally, after rude pagan ceremonies, a procession was formed and the body was borne away to be either burned with loud lamentation or deposited in some tomb which nature had prepared in the rocks. Could the observer from a distant and civilized age have been lifted up over Western Europe in the epochs of aboriginal barbarism he might have seen, winding here and there in solemn manner, the funeral processions on their way to the burial places of the tribe. The scene was as picturesque as instructive. The place chosen for burial or incineration was generally a solitude of cliff and wild There, about the entrance of the cavern, might be seen the gathered friends of the dead lamenting with wild gesticulations that going forth of man-life which



FUNERAL IN THE NEOLITHIC AGE.—Drawn by Emile Bayard.

they—though barbarians—had already discovered to be without return.

Funeral processions and rites of sepulture.

The next point of interest to be noted in our examination of the prehistoric burial places is the character of the remains in such situations. As in the case of the cave dwellers, we may here learn much about the stature, form, and general character of the aborigines of Europe.

FUNERAL FEAST IN THE AGE OF BRONZE.—Drawn by Emile Bayard.

The most striking fact in connection with the skeletons of the people buried in the tumuli of the British Isles is the variation presented in the skulls. There seem to be three distinct types of skull revealed by an examination of the tombs. These are what are called long skulls, or dolichocephalic crania; short skulls, or those defined as brachycephalic; and a type between the two extremes, called orthocephalic, or medium-headed. The orthocephalic skull is most nearly like the skull of civilized peoples, whereas the other two types depart very much from the common standard. As far as we are able to discover, the two extreme varieties of crania belonged to very primitive peoples, while the intermediate form is of more recent development as well as more symmetrical character.

The three types of skulls discovered in the tombs.

The long skull, such as has been found in many of the tumuli of Great Britain, has almost as great a measurement as that of the Neanderthal head described in a previous chapter. Not that the long and narrow skulls of the tumuli are so distinctly animal as the

Character of dolichocephalic and brachycephalic crania.

one to which reference has just been made, but their striking feature is the long suture and great measurement from front to rear. The brachycephalic crania discovered in the mounds are exactly the opposite of this. They are peculiarly short from front to back, and in many cases suggest to the antiquary that they have been squeezed up into unnatural dimensions. It seems, however, that no marks of artificial pressure have been discovered, and doubtless the short skulls are just as nature produced them.

Another circumstance well calculated to excite the keenest interest is now to be noted. *There is a constant and curious relation between the shape of the skulls and the shape of the tumuli in which they are buried.* There are two kinds of mounds: a circular tumulus and an elongated barrow; and it is found on examination that the dolichocephalic heads are invariably *in the long barrows*, while the short heads are in the circular mounds! The evidence is conclusive that this arrangement could not have been accidental, and it is almost equally clear that two races, belonging perhaps to different prehistoric epochs, are represented in these tombs. Very careful explorations have been made by skillful antiquaries. Dr. Thurnam, of England, has made accurate measurements of a hundred and thirty-seven skulls just as they were taken from the British mounds. Of these, sixty-seven were exhumed from long barrows and seventy from circular tumuli. Not a single long skull was found in a round tumulus, or a single short skull in an elongated barrow; from which it appears conclusive that the long-headed tribes buried their dead in the elongated tumuli, while the circular mounds were used for the burial of the short-headed people. It would be pressing the argument too far to say that these prehistoric inhabitants of Great Britian made the long barrows which they raised over their dead in *imitation* of the shape of their heads, but the fact remains that such queer analogy does exist and remains to be accounted for.

Coïncidence in shape of skulls and burial mounds.

The tumuli contain almost invariably a sort of stone sarcophagus in which the human remains are deposited. In the cases where cremation has been employed, the ashes of the dead are put into a rude urn and the latter buried in the place of the body. In the stone box are found the implements and utensils which were left with the dead, and this fact, as already indicated, points to a belief in a hereafter. It is perceived that these rude people had hopes of a continuous existence or a revival of existence beyond the event of death. This does not, however, imply any belief in what is called the doctrine of the immortality of the soul. The evidences about the dead in these mounds all point to the confidence which the living then had of the continued *material* existence of the person buried. Every article found in connection with the body is clearly related to the ordinary daily wants and conveniences of the deceased, and the significance of such association of his implements, and even of food, with the person deceased, points only to the belief that the dead would continue as he had been, or at least revive at some time, in his former state of being.

Sarcophagi and contents; provisions for the dead.

It must not be supposed that all of the facts here referred to are deduced from the mounds locally associated with the old ruin of Stonehenge. They have been gathered rather from many sources.

General distribution of burial mounds in Western Europe.

FUNERAL OF A CHIEFTAIN IN THE AGE OF IRON.—From the *Magazine of Art.*

and are typical of all. This species of burial under mounds was practiced in all parts of Great Britain and nearly everywhere on the Continent. The peninsula of Denmark is almost picturesque with tumuli, and under them all are the remains of a prehistoric people. Perhaps not a single county in England is without its monuments of this kind. Not only in Wiltshire, but in Gloucestershire and Berkshire, and, indeed, everywhere on the island such evidences of a primitive people are discovered. In Ireland, also, and in Scotland, the tumuli are plentifully scattered over the country, and are indeed in some places so abundant as to suggest the frequent burial grounds of modern nations.

TUMULUS WITH STONE ENTRANCE, NEAR UBI, DENMARK.

The suggestion has been made above that two or three races contributed to people these ancient sepulchers. This belief has well-nigh passed from theory into fact. It has been noticed that all the stone implements discoverable in the burial mounds have been associated with the long heads, whereas no weapon or utensil of stone has been found in any sarcophagus where the short-headed tribes put away their dead. In the vaults of the latter, on the contrary, the implements are all of bronze, and the workmanship indicates a very great advance toward civilization as compared with that of the utensils found in the long-head tombs. It should be said, moreover, that the stone tools and weapons in connection with dolichocephalic skeletons are not by any means of so primitive a pattern as those found in the shell mounds or the cave dwellings of the Continent. They are, on the contrary, neolithic, or new stone, implements, which shows that the long-headed tribes flourished in the epoch before, but approximate to, the age of bronze. It might not be hazardous to infer that the round heads came into the island as a bronze-bearing soldiery, overcame the long heads, or amalgamated with them, and then adopted like methods of burial. It has been remarked that the Lapps and Finns and several other existing races in the north of Europe are brachycephalic, and the hypothesis of an invasion from this region and a conquest of the prehistoric Britons is by no means beyond the limits of right reason.

Evidence that several races were concerned in the tumuli.

After Stonehenge, perhaps one of the most interesting monuments in the west of Europe is that of Carnac, in Bretagne. It consists of eleven rows of unhewn stones, set up after the manner already described, but not in circles. Some of the pillars are as much as twenty-two feet in height. But in their present state they differ greatly in dimensions, some being scarcely discoverable above the level of the plain. As far as the antiquary has been able to trace a design for the ruin, it appears to have been a series of avenues several miles in length. At the present time, however, it is difficult to make out the entire area or the

Megalithic ruin of Carnac in Bretagne.

complete idea of the builders. The adjacent farms have encroached upon what was doubtless sacred ground, and many of the stones, even whole sections of the avenues, have been cleared away. In other parts it is still easy to note the direction and course of the rows of columns, the width and character of the intervening spaces, and something of the general design.

It is believed by scholars best informed on the subject that this ruin of Carnac has an origin somewhat more remote than that of Stonehenge. Around the latter the tumuli belong, for the most part, to the age of bronze. But the mounds of Bretagne, and it is thought Carnac itself, are relics and monuments of the neolithic age of an earlier date.

The fact has been mentioned that in many of the tumuli more bodies than one have been deposited. It appears, however, that in most cases these multiple buryings in the same vault took place at different times. The primary burial, perhaps, included but a single person, but at a subsequent time another body would be deposited in the same rude sarcophagus which held the first. This would involve the opening of the mound. The stone box in the bottom was generally large enough to contain the remains of several persons, especially when the sitting posture had been adopted in sepulture. The prehistoric people had the same respect for the bodies of the dead that modern races have cherished. It appears that only in rare instances were the original remains displaced from the sarcophagus to make room for a new occupant. In case of second burial, there was merely a rearrangement of the old skeleton to make room for the new.

Practice of successive buryings in the same mound.

It has already been mentioned that cremation was practiced at the same time with the common mode of burial. The coëxistence of these two methods of disposing of the bodies of the dead has been noted in the case of many peoples, ancient and modern. The Eastern nations employed both. The Greeks sometimes buried their dead and sometimes burned them to ashes. So also the Romans, and even at the present time we note the reäppearance of cremation and its contest for the mastery as a scientific method opposed to the unscientific, and even superstitious, disposition of dead bodies in the earth.

Coïncident usage of earth burial and cremation.

RUINS OF CARNAC, BRETAGNE.

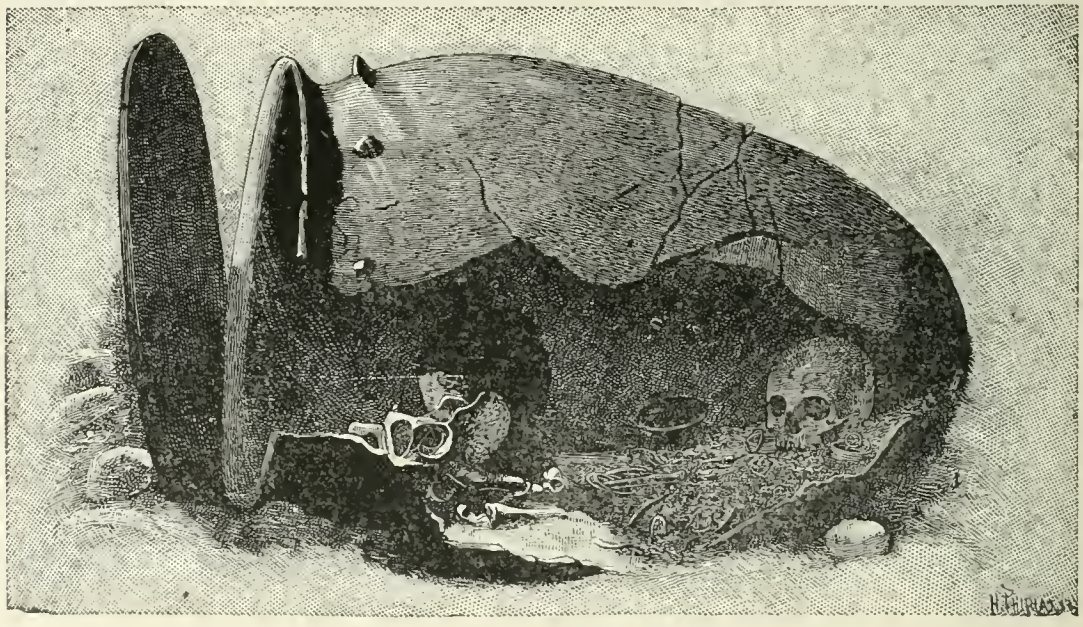
In the case of the tumuli we know, from the examination of the other relics left in connection with the burial urns, that the latter belonged to the same epoch as the commoner method of sepulture. It must be noted in this connection that incineration of the dead was by no means so complete in the times of which we speak as by the superior processes of modern times. The ancients, especially the barbarian ancients, were unable to produce a high degree of artificial heat. The bodies of the dead were simply exposed to the action of an open

Imperfect incineration of prehistoric remains.

fire, and there was a larger residuum to be put into the urn than the mere handful of ashes left from the cremation furnace of the present time. In general, the larger and heavier bones were merely charred, and these, together with the ashes, were put into the rude urn and set in the stone box in the bottom of the tumulus.

Another fact of much interest is that the relics of human life and human need, so many times referred to in the preceding pages as accompanying the remains of the dead, are by no means always found in the tumuli. In very many, even a majority of cases, nothing at all is found except the skeleton or skeletons of them that were buried. A gradation is noticed in the number and character of the weapons, utensils, and articles of food deposited with the body. Sometimes they are plentiful and sometimes scarce. This indicates a difference in rank and station among those deceased and among their friends who buried them. Doubtless it is improper to use the words *rich* and *poor* in this connection; but even in the reduced stages of human evolution distinctions in property and respect begin to appear, and it was no doubt on this basis that the distribution of relics in prehistoric graves was made. The wealthy, if we may use the term, had more respect and more emblems of that respect in the day of burial. The poor, as in all ages, went down to the potter's field without such tokens of esteem. It is to be presumed that the articles deposited generally belonged aforetime to the person buried, and inasmuch as one would have many things and his less enterprising fellow have nothing but a spear or an ax, the first would be buried with many relics and the other with few or none.

Deposition of gifts and provisions for dead not universal.



BROKEN SEPULCHRAL URN, SHOWING INCINERATED REMAINS.

The two English naturalists, Bateman and Greenwell, have given us the results of their observations in about four hundred tombs belonging to the prehistoric age. Of the two hundred and ninety-

Classification of skeletons and implements in the mounds.

seven examined by Mr. Bateman fully one hundred had no relics of any sort other than the bare skeletons of the persons buried. In forty of the tumuli he found drinking vessels and food vases. A hundred and five had implements and weapons in connection with the skeletons, and in thirty-five instances articles of pottery were found. Of the one hundred and two mounds opened by Mr. Greenwell only thirty contained implements or weapons, and the other seventy-two were devoid of relics. In all the tombs which this naturalist examined the skeletons were found in a sitting posture; never recumbent.

In some of the mounds there are evidences of what may be called the beginnings of ideality. Instead of actual weapons and implements, *models* of the same are sometimes buried with the dead. It has been noticed in modern times, particularly among the Esquimaux, that this usage prevails. A mock weapon is put in the place of the real one in the tomb. Another fact must be borne in mind in this connection, and that is that the presence of implements and weapons in the graves of these ancient peoples does not indicate positively their belief that the dead would revive to need and use their weapons again. The symbolical idea, the idea of commemoration, and the influence of tradition may all combine to give another significance to the presence of these

INCINERATION OF THE DEAD, IN THE AGE OF THE TUMULI.
Drawn by Emile Bayard.

Deposition of models; what the findings signify.

relics in the grave. Doubtless at the first they must have been buried with the dead in the belief that they would be useful to them in another life analogous to the present. Custom in this respect would soon grow into habit, and habit would presently have the force of law. The usage would perpetuate itself after the belief had perished. To the present day, and even among the most civilized peoples of the world, many usages obtain with respect to the dead, the significance of which could not be deduced from the literal facts present in the inquiry. Nothing is more common than to deposit with the dead various articles which have simply an affectional and commemorative signification. The marriage ring remains upon the finger. Favorite ornaments are carefully adjusted as the owner was wont to wear them. Particularly are the regalia and insignia of rank put into the tomb with the departed. The priest is buried with his cross, the sailor with his compass, and the warrior with his sword. None of these things signify an existing belief in the further usefulness of these articles to the dead. They are commemorative merely, conventional marks of rank, of association, and affection on the part of the living.

To a certain extent these principles no doubt operated with the prehistoric peoples; and all inferences relative to the meaning of the articles found in the barbaric tombs of extinct races must be checked and corrected by what we know to be the general laws and tendencies of human nature. Opinions and beliefs pass through many mutations, and custom is known to be more persistent than either. Long after the fervid conviction of the truth of a certain doctrine and theory of human life and death has passed away or given place to a mild and inoperative assent of the mind, the ancient usages which were based on that belief in the epoch of its pristine vigor continue to be observed, and these might well convey to distant ages an erroneous impression of the current opinions of the people.

Meaning of articles must be inferred from human nature.

CHAPTER XX.—PREHISTORIC RACES OF AMERICA.

VESTIGES of prehistoric races of men are by no means limited to Europe and the countries of the East. In the three Americas also such traces of peoples unknown to history are abundantly distributed. It remains to note in the present chapter at least the prominent features of the ancient monuments of our own country and of the continent south of the isthmus of Panama. It is the intention merely to sketch the outline of our primitive monuments, and to deduce therefrom a few general conclusions relative to the peoples by whom they were built and the ages in which they flourished.

In all parts of North America, from the Alleghanies to the far West, and from the great lakes to the gulf of Mexico, a class of monumental remains may be observed by the traveler and antiquary sufficiently impressive in their extent and variety, and strikingly suggestive of a remote antiquity. Even

Abundance of mounds in the three Americas.

in the countries east of the Appalachians many such monuments are found. They were noted on the first arrival of the civilized races on this continent, but their significance was long ignored. It was supposed at the first that they were the works of the then existing tribes inhabiting the New World. In fact, many of the remains which are now the subjects of antiquarian research were the products of the barbarous peoples of North America and the semicivilized races of Mexico, the Central Isthmus, and Peru. It requires some degree of acumen at the present day to distinguish between those monumental remains which are referable to the peoples possessing this continent in the times of the discovery of America and subsequent, and those other more monumental trophies of the ages long before. Modern inquiry, however, has easily sifted this question to the bottom, and the scholar of to-day is no longer perplexed by the confusion of the later with the earlier monuments.

GREAT MOUND NEAR MIAMISBURG, OHIO.

Perhaps at the beginning of the inquiry it may be well to note the extreme antiquity of the tumuli and earthworks of America as indicated by their geological relations. On this continent, as well as in Europe, the great rivers were aforetime much vaster in breadth and volume than at the present day. They filled the valleys from hill to hill with great floods, sweeping on to the sea. In the long course of ages the rivers shrank to comparatively their present dimensions, and in doing so withdrew their waters from the hills which constituted their barrier on either side, and sought a narrower valley and a lower level. There have thus been formed what may be called the first or lower river bottom and the second plateau above.

Antiqnity of the mounds indicated by their situation.

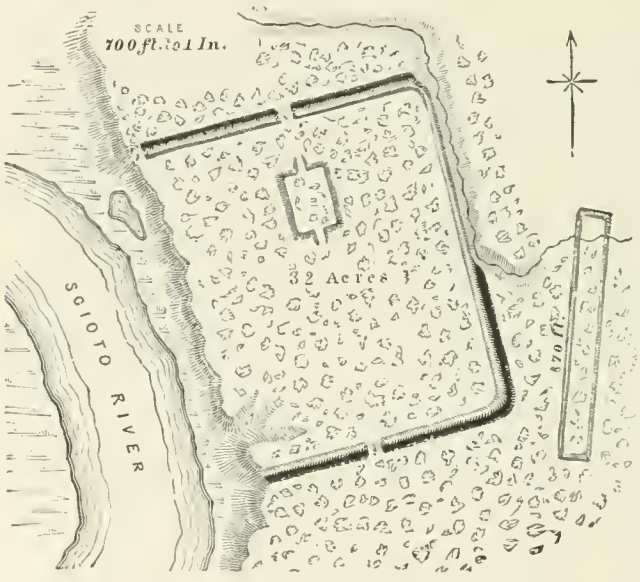
It is, perhaps, impossible to determine at what remote period this retreat from the higher to the lower level and from the broad floods of the earlier geologic epoch to the modern streams which traverse the continent at the present time occurred; but such is the history of the change which has taken place. In no single instance has one of the prehistoric mounds of our country been discovered on the lower terraces formed by the river. They are found in many places on the higher plateaus and on uplands round about, but never on the present or recent levels of an existing stream. From this it has been clearly inferred that the mon-

Prehistoric earthworks not found on lower river levels.

uments in question were built before the recession of the rivers into their present channels; and it can hardly be doubted that the races who flourished in that primeval age looked down from a humid atmosphere on a world abounding in turbid waters.

The frequency of the American tumuli has already been remarked. They abound. In all parts of the Mississippi valley the outlines of earthworks and burial mounds may be discovered.

General mystery and interest excited by the mounds.



EARTHWORKS AT CEDAR BANK, OHIO.

Their numbers reach easily into thousands, and their importance was such long ago as to constitute the subject-matter of the first volume of the Smithsonian *Contributions to Knowledge*. They have demanded the attention of scholars and antiquaries during a great part of the present century. Though vast stores of information have been gathered from their exploration, the mystery of their ultimate origin and design remains as impenetrable as when they first drew the attention of the pioneers.

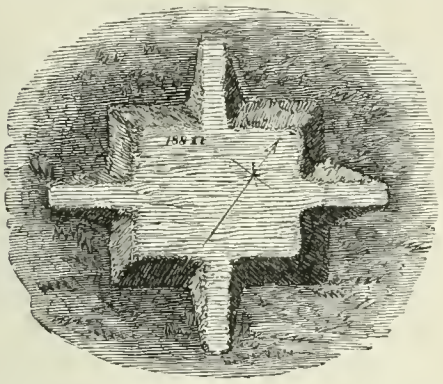
In some localities the mounds and tumuli are much more frequent and important than in others. In general, the upper terraces along the great streams which contribute to the Father of Waters are the sites of the most striking and instructive of these monuments. But beyond the limits of our own country, in Central America, in Mexico, and in Peru, and other parts of the southern continent, these evidences of extinct civilizations are plentiful.

The valley of the Ohio seems to have been a favorite seat and stronghold of the prehistoric peoples by whom these monuments were reared. One of the most famous of them all is on the banks of the Little Miami river, and from its evident character is called Fort Hill. Another work of great importance is at Newark, Ohio. One of the greatest of the mounds is situated on the plain of Cahokia, Illinois, opposite the city of St. Louis. Another of striking character is found on Grave Creek, near Wheeling, in West Virginia, and still another at Miamisburg, in Ohio. One of the most striking of all is in the same State, at Cedar Bank, on the Scioto, and in various parts of Ohio, Indiana, and Illinois such remains are found, even at random. Far to the northwest, in Wisconsin and Iowa, the primeval race left its imperishable vestiges; and some of the most interesting mounds of the kind are discovered in those States. South of the river Ohio, also, such remains of primeval man are plentiful. Tennessee abounds in mounds, and Alabama and Mississippi have many such remarkable monuments. Indeed, it would be easier to specify in what parts of the great valley of the Mississippi

Ohio valley a favorite seat of prehistoric works.

such remains of an extinct race are *not* to be found, than to note all the localities where they exist.

The American monuments, like those



PLAN OF SQUARE MOUND, NEAR MARIETTA.

of Europe, differ greatly in dimensions, importance, and general character. The most striking of them all were manifestly military fortifications. These are laid off and executed as if by an engineer of modern times, though the design is greatly different from any that would now be used in military operations. Great is the extent and area covered by some of these works. The remarkable monument at Fort Hill, Ohio, has a circumvallation of nearly four miles, and the height of the mole, or *agger*, is from ten to twenty feet. Outside of this is a ditch, and the whole arrangement was manifestly one of defense against a powerful enemy. In the first place, an exact circle of great extent is drawn upon the hill; and around the circumference the earthworks are constructed. The circle is not quite closed on one side, but has a protected entrance, flanked with long lines of earthworks branching to the right and left. These, in their turn, are defended by other lines running out nearly in the form of a great rectangle in front of the entrance to the circle. Even beyond this rectangle, at two of the corners and in other positions, are smaller circles and long mounds of earth of peculiar form. No one can view the situation and consider its extent, and even the skill with which the fortifications were planned, without being amazed at the strength, capacity, and even genius of the people by whom they were constructed.

Military design of the principal circles and mounds.

The great fortifications at Newark, Ohio, are fully two miles square. More than twelve miles of embankment, ranging from two to twenty feet in height, mark the outline and nature of the defenses. The mound on the plain of Cahokia is seven hundred feet long and five hundred feet in breadth. Its height is

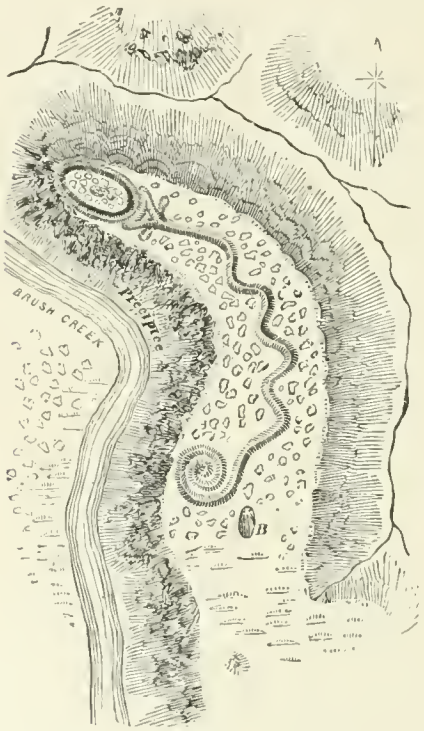
Ohio fortifications; the mound of Cahokia.

EARTHWORKS AT HOPETON, OHIO.

ninety feet, the superficial area about eight acres, and the contents nearly twenty millions of cubic feet. The mound on Grave creek, in West Virginia, has an elevation of seventy feet, and the one at Miamisburg, Ohio, is nearly as great in elevation and extent.

We come now to consider some of the strangest monuments which the human race has left in its track. It has been discovered that many of the embankments and outer works under consideration have the form of men or animals.

Earthworks in the form of beasts and serpents.



GREAT SERPENT MOUND, IN ADAMS COUNTY, OHIO.

It is not uncommon in the States of Wisconsin and Iowa to come upon one of these ancient works which, considered in its entirety, presents a huge effigy of man or beast. There is no mistaking the design. It was manifestly intended to represent a living creature, laid prone or in profile on the earth. The effect is that of a huge bas-relief, developed from the ground. Still more astonishing is the great serpentine mound on the banks of Brush creek, in Ohio. The mole of earth representing the serpent is, from head to tail, over a thousand feet in length. The figure is five or six feet in height and nearly thirty feet in width at the base, diminishing gradually toward the tail. At the sides of the neck are two flat, or ear-like, projections, and the mouth stands wide open. Right in front of the mouth, and placed as if issuing therefrom, is a large circular elevation four feet in height, in the shape of an egg. It is as though the serpent had either ejected or was about to swallow the great body partly inserted in its jaws! The long line of the work representing the serpent's body is arranged on the curvilinear crest of a natural elevation, parallel with the stream, and the whole may well be regarded as one of the most astonishing relics of human caprice.

The serpentine mound of Brush creek, Ohio.

In connection with these mounds and earthworks are the remains of the dead. The circular mounds when opened generally reveal skeletons of a prehistoric race, and in connection with these are found the implements and utensils peculiar to the epoch in which the mounds were erected. Another fact of interest in connection with the greater works which we are considering is the association of what appear to be religious structures and designs. Within the circumvallation of what was manifestly a military defense, will generally be found what has been thought by antiquarians to be the outlines of a sacred edifice or, at any rate, a sacred site where the religious ceremonial of the people was doubtlessly celebrated. Many marks of the significance and purpose of this

Religious purpose manifested as well as the military.

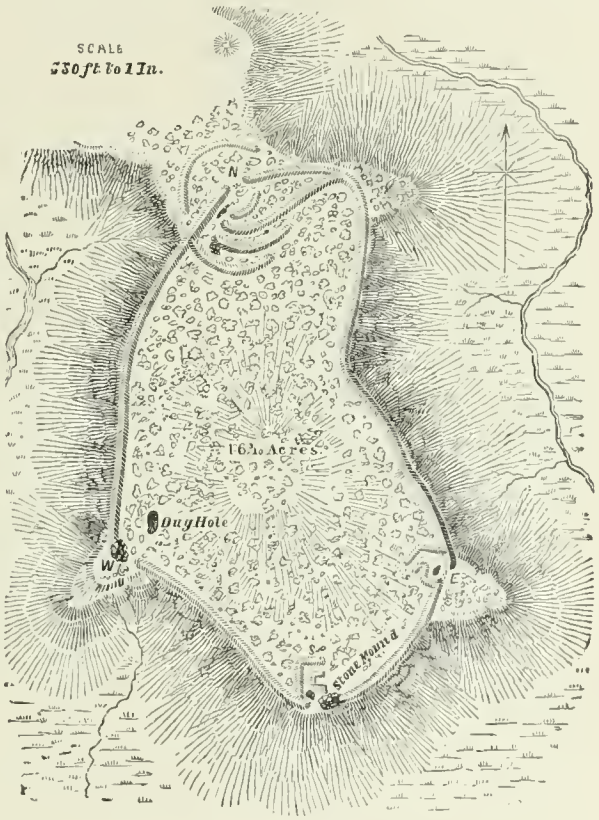
part of the works have been discovered and explained, from which it is inferred that there was something more permanent about the fortifications than would be expected in the case of transient defenses thrown up against an enemy. These earthworks appear to mark the sites and strongholds of the people, to which they rallied in the times of national tumult, and which constituted a sort of military capital for the country.

The American antiquities under consideration have given rise to many theories and speculations. Ever and anon some new and empirical view has been put forth as to the origin of the mounds and fortifications and the people by whom they were reared. It is surprising to what extent these speculations have been carried. Those who have theorized on the subject have in many instances been entirely unscrupulous in regard to the means by which their theory was to be substantiated. Forgeries innumerable have been perpetrated with a view to bolstering up some preposterous theory about the mound builders. Inscriptions have been made to order, in Greek and Hebrew and Celtic, and even in the Runic characters of the Northmen, to substantiate what the forgers had given out as an explanation of the mounds. But meanwhile a truer interpretation has been going forward under the care of scientific antiquaries, and the foolish stories which have been invented relative to the prehistoric earthworks of America will find no further credence among intelligent people.

Forgery substituted for scientific investigation.

Many are the legitimate inferences which may be drawn relative to the life and manners of the people by whom the American prehistoric monuments were built. In the first place, there are evidences of a vast and far-reaching intercourse among them. The relics that are found in the mounds are drawn from different and distant localities, and their character indicates, in general, a social and industrial state, in a tolerable stage of development.

Far-reaching intercourse; the mound potteries.



FORT HILL, BUTLER COUNTY, OHIO.

In the tumuli and earthworks we find many articles of pottery, greatly superior to the corresponding relics in the primitive tombs of Great Britain and the Continent. The American articles are frequently of elegant design. Many carved works in stone are found in the same situations, and ornaments of silver and copper, almost worthy of a modern jew-

eler, are taken from their resting places alongside of ancient skeletons.

The materials of these utensils and articles of adornment are derived from many and distant places. The source of the silver is not known, but the native copper has evidently been brought from the mines of lake Superior. The mica, of which other ornaments are made, is from the Alleghanies. Beautiful shells are found in the same situations, which had their home in the gulf of Mexico. Implements of obsidian and porphyry, of Mexican origin, are frequently discovered with the other relics. As to such implements and specimens of art of European origin as have occasionally been found in the sepulchral mounds of the New World, they are to be traced unmistakably to later burials in the ancient tombs.

Materials deposited have been brought from great distances.

VASES FROM MOUNDS.

Another deduction of much importance is that which relates to the extent of these prehistoric populations and the nature of their industries. It must have been a populous nation out of whose activities sprang these great mounds and fortifications. The amount of labor expended on such a monument as that in the plain of Cahokia is like the sum of the toil which reared the pyramid of Cheops. Here we have a mass of twenty millions of cubic feet of earthy material heaped up in regular form and with a definite design. The labor of many thousands was required to do it; and when we reflect upon the imperfect facilities which the old races possessed for the execution of such works, we are still further astonished at the magnitude of the enterprise.

The mounds constructed by populous races.

It is known to all that tribes inhabiting a country in the character of hunters and fishermen are always sparsely distributed. The most abundant natural supplies are only sufficient for a small population. The hunting stage of society is, therefore, always limited to a small and widely scattered population. It requires the agricultural stage of development to produce and maintain a thickly settled people. The artificial resources of the soil must be added to the native resources of the woods before a great population can be created or maintained. Therefore, these prehistoric races who built the American mounds and forts must have come out of a primitive stage of barbarian life and entered upon the agricultural epoch. Their industrial life must have been large and regular to support and foster such enterprises as we have before us; and the methods and economy and distribution employed by them must have resembled, if they did not approximate, the methods and facilities of the historical era.

Mound builders had passed the hunting stage in development.

Still a third consideration is clearly deducible from the evidence of the mounds. A great fortification laid out with geometric precision and executed as if by regular engineering implies not

only a *defensive* array of the means by which a people would protect itself from attack and destruction; it also implies *an offensive and opposing power*, an enemy, numerous and dangerous to be combatted and warded off. It does not imply such an enemy as would be encountered in the hunting or nomadic stages of tribal development. That is, the means of defense would, under the common law of reason, be proportioned to the resources, aggressiveness, and skill of the foe.

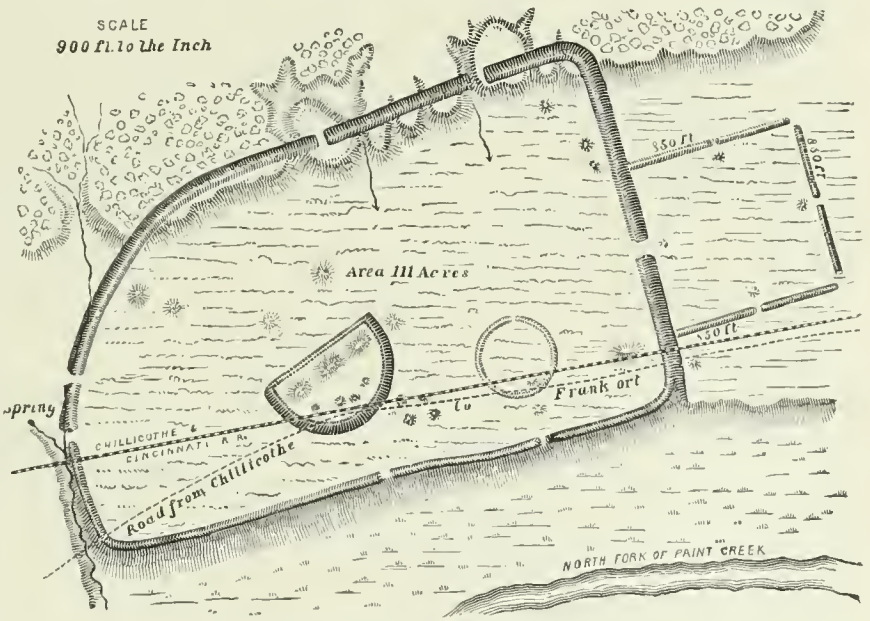
Deductions from the military character of the works.

We can easily see, in these considerations at least, the outline of great nations contending for the mastery of the Mississippi valley. No other hypothesis will explain the facts. There must have been in these regions, in an epoch long antedating the era of the Red men, great agricultural peoples, with institutions of religion and war. There must have been intercourse and relations with other peoples like themselves, and these must sometimes have been relations of hostility. Indeed, it would appear from the strong military character of the greatest and most important of the monuments that war was, even in these prehistoric times, the most marked and vehement activity of the human race.

Great peoples demanded to account for American antiquities.

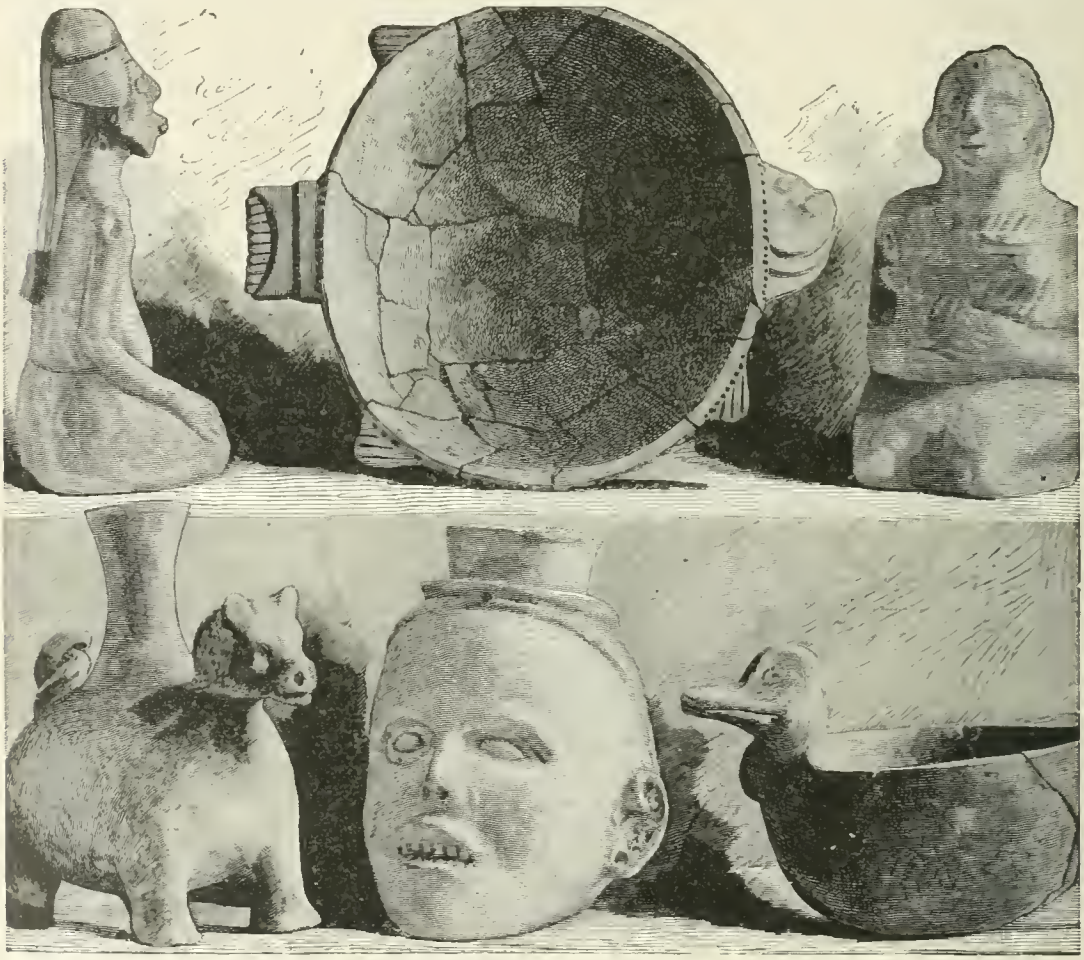
A comparison of the skeletons found in the earth mounds of the New World with those discovered in the tumuli of Great Britain indicates clearly the greater antiquity of the former. The earth surrounding the bones and other human relics in the American mounds is exceedingly dry and compact. The situation is generally favorable in the last degree to the preservation of human remains. Below the level of frost and entirely impervious to water, the dry earth surrounding and covering the vaults seems to have been untouched by any natural force for ages. And yet the skeletons in the American tumuli are nearly always far gone in decay. It is difficult to preserve them after their exposure to the air. They generally crumble as soon as they are taken from their long resting place. Even the skull bones generally turn to a white powder with a few days exposure to the atmosphere. In the British mounds the human remains are generally well preserved. Notwithstanding the moisture to which they have been

Evidences of greater antiquity in the American mounds.



MILITARY WORKS ON PAINT CREEK, OHIO.

exposed in the earth and the humidity of the air of England, the skeletons stand well on being exhumed, and are safely transferred to their places in museums. In some instances this may be done with the mound builders of America, but not often. The naturalist will not fail to discover in the conditions and common type, but those taken from remote tumuli show strong marks of ethnic divergence and peculiarity. As a rule, the crania and arm bones are strictly human in their development. They conform to the ordinary standards of measurement and proportion, but the skulls are foreign, not to say aboriginal,



POTTERY OF THE MOUND BUILDERS.—From *Magazine of Art.*

facts before him the evidences of a greater antiquity in the case of the American remains.

Indications of race variety; character of prehistoric crania.

Considerable variety of race has been remarked among the skeletons exhumed from the American mounds. They differ much in form and stature. Those in a given locality generally belong to a in their form and structure. They do not correspond with the crania of any existing race of people. On the whole, they are more in analogy with the skulls of those Oriental peoples who inhabit the eastern shores of the Pacific and the outlying islands. Some well-preserved skulls, taken from prehistoric mounds in Indiana and preserved in the museum of

that State, have a striking likeness to the heads of the Japanese, but are smaller in capacity than the crania of that people

On the whole, the prehistoric races of North America were rather under the average stature of the Red men or the civilized peoples of our continent. Sometimes remains are found which are really diminutive. Nor are the cases of this kind isolated or peculiar. On the Cumberland river, in Tennessee, several prehistoric cemeteries have been examined, in which the remains are uniformly of a small race. So marked is this peculiarity that some have supposed that the skeletons in question are those of infants and children. But a closer examination has proved them to be adult. The region in which these pygmy cemeteries are located is very favorable for the preservation of the dead. The soil is dry and sandy. The remains are invariably found in small stone boxes, and the observer can hardly believe that they are the skeletons of a full-grown, adult people.

The Little Men of the Cumberland and Tennessee valleys.

On thrusting down from the surface a sharp iron rod the stone lid of one of these small crypts may be found, and on excavating the earth the box can be examined in its undisturbed condition. The graves have been constructed originally by excavating small, oblong vaults and placing thin, undressed slabs of sandstone at the bottom, sides, and ends. After the burial a flat capstone was placed on top, thus completing the box. The inside of one of these miniature sarcophagi measures from ten to fourteen inches in width, ten to twelve inches in depth, and from fourteen inches to two feet in length. The space is so small that no well-grown person of an existing race, unless it should be a native Australian, could be buried in it, even in a contracted position. But the prehistoric skeleton which is found inclosed has, generally, room enough, though the parts are frequently flexed and sometimes doubled back. The mounds covering the prehistoric pygmies are thickly strewn in favorable positions along the banks of the Cumberland.

Character of the graves; the sarcophagi, and the remains therein.

The manner and epoch of the disappearance of the mound builders from North America remains conjectural. Nor is it likely that the ingenuity and adroitness of human scholarship will ever be able to exhume from the past the manner and time of their disappearance. On the whole, they would seem to have been a people worthy of a history; but their extinction was so complete that whatever may have been the extent and variety of their national life, all has gone out together. Philosophers have devoted volumes to the causes of national decline, and the question is still open for rational solution.

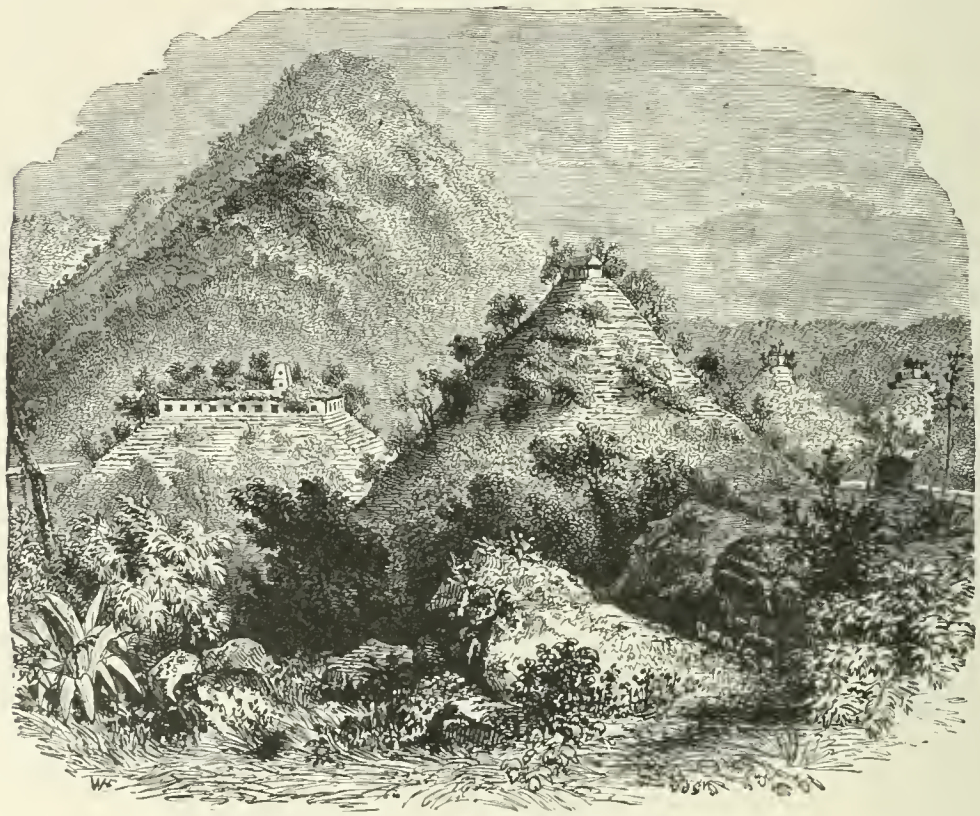
Manner of the extinction of prehistoric races unknown.

It may be truthfully urged that the seeds of ethnic decay exist in certain peoples in virtue of their own constitutions and the nature of their activities. Whether races grow old and die as the individual; whether different families of men are deflected by evolutionary processes from one phase of existence to another; whether sudden metamorphoses take place, in obedience to natural laws, such as are alleged to occur at rare intervals in the animal kingdom, are philosophical questions which the inquirer of the future must solve, if indeed they are soluble at all.

Certain circumstances, however, may be cited which are at least effective as assisting forces in the extinction of races. The prevalence of vicious and

luxurious habits, gradually supplanting the early and robust virtues of a people, tend unmistakably to national overthrow. The external forces of war and the great cataclysms of nature may also account for the destruction and disappearance of peoples. It is doubtless true that in prehistoric ages great submergences of peopled islands and continents have taken place, while others have risen, dripping, from the deep. Earthquakes and volcanic disturbances of the great crust of the globe have terrified and driven away what they have not engulfed. Finally, famine and pestilence have done their work on prehistoric as well as historic races. There are times within the recorded story of national life when not only the depopulation of great districts, but the extinction of whole nations has been threatened by the rage of epidemics. Among uncivilized peoples the accumulation of stores for the future is but little attended to. That prudence and foresight which keeps up the resources of life against the day of calamity are but little practiced by barbarians, or even by races half emerged from barbarism. For these reasons prehistoric peoples have been greatly exposed to the ravages of famine. At intervals the earth has unaccountably withheld her gifts. A few seasons of want in succession would be sufficient to exterminate an isolated and uncommercial nation, and that such calamities have actually fallen upon peoples like the mound builders of America can not be doubted.

Forces that tend to the extermination of races.



AZTEC RUINS AT PALENQUE, IN CHIAPAS, MEXICO.

Beyond the limits of the United States the tumuli and other evidences of bygone races are generally secondary. In

one sense they are prehistoric, but in another they fall, for the most part, within the activities of peoples who have been known within the historical epoch.

Extinct peoples of Central America nearer to the present.

The Mexican races that flourished in the days of the Spanish invasions, at the beginning of the sixteenth century, may well be considered as the remote extreme of the people by whom the monuments of Mexico were erected. The same is true of the peoples of Central America and of the Peruvians. The Aztecs, the Coztecs, the Guatemalian tribes, and the Peruvians, though much more advanced than the Red men of North America, are collateral with them in time and national development. In the case of our North American Indians, we know that they belonged to a different race from the mound builders, and that they flourished in an age long subsequent to the prevalence of the former on this continent. We have not the same clear evidence of the existence of a people back of the Mexicans, the Central Americans, and the Peruvians. Such a people may have existed, and there are evidences here and there of a truly prehistoric basis for that type of national life which was encountered by the Spanish invaders under Cortez and Pizarro.

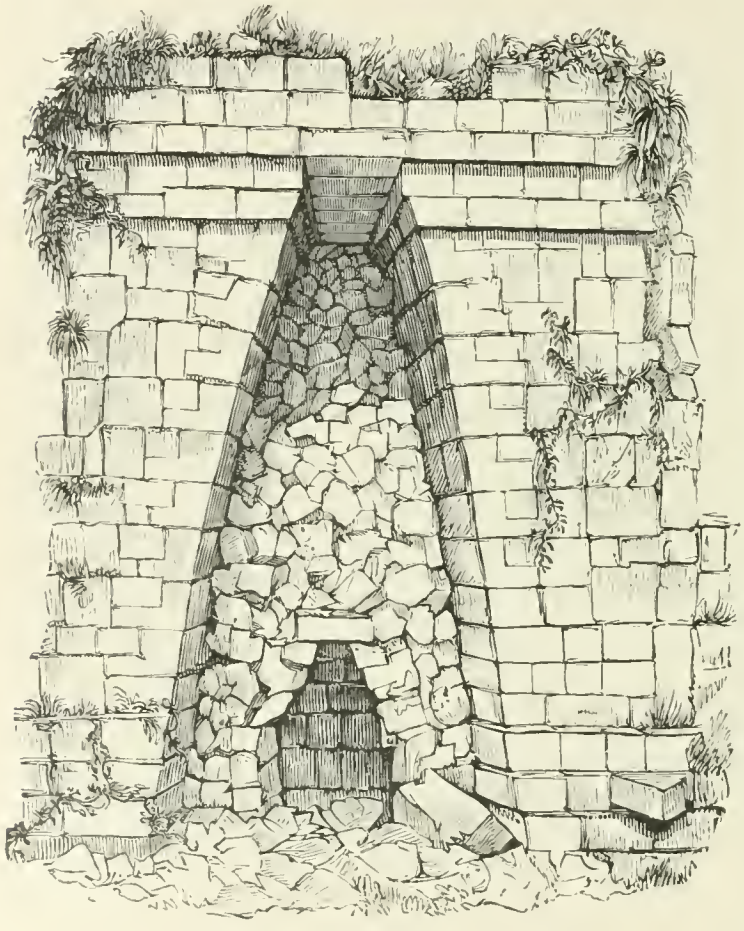
The ancient monuments of Mexico are among the most imposing of primitive ruins. They have a solidity and grandeur suggestive of the vast structures which the antiquarian encounters in the valleys of the Nile and the Euphrates. They differ fundamentally in their character from the mounds and fortifications of Central North America in this, that the latter were military structures in their first intent, while those of Mexico are based upon religion and its ceremonials. In the case of the North American tumuli, the long moles and circumvallations were created under the warlike purpose of the race that reared them, and the religious part of the monuments are only secondary to the dominant ideas of warfare. In the Mexican tumuli and pyramids the exact reverse is true. Evidence is not wanting that they at times subserved a military purpose—that within their ramparts the nation retreated and defended itself against the foe. But the general idea of all the monumental remains in the region under consideration is that of religion and priestly ceremonial. A general sketch of the character and purpose of the Mexican monuments can not fail to prove of interest.

Mexican monuments indicate the religious purpose.

The structures in question have all, with very few exceptions, a common plan. A great square is laid off on the earth, with its four sides to the cardinal points of the compass. This square is surrounded with walls strong and high. The structure of the same is sun-dried bricks, or even in some cases stone. Centrally located within the great rectangle thus inclosed is the site of the temple. A square foundation of solid masonry is laid, extending to two hundred, three hundred, or even five hundred feet on each side. From this foundation a great structure like a pyramid is carried up in a succession of terraces. The design is almost identical with some of the oldest monuments of the human race found in the valley of the lower Euphrates and attributed to the ancient Chaldæans. In both instances the successive platforms of masonry grow smaller toward the top, and in both there is generally a deflection of the work toward one side, so that the pyramid does not stand centrally over the

Plan and materials of the pyramidal temples.

foundation, but nearer, as a rule, to the western edge. The eastern side of the pyramid, facing the morning sun, is ascended by a flight of steps to the upper square. The structure is truncated; that is, cut off above without being carried to an apex. On the upper platform is built the temple proper, which also faces the east. Sometimes on the terrace more temples than one are reared. It is in evidence that several deities were worshiped from the same platform. Each had his own fane and ceremonial.



AZTEC STRUCTURE—ARCH OF LAS MONJAS.

Temples of the kind here described were plentiful at the time of the Spanish invasion of Mexico. Cortez declares that he found fully four hundred of them in the state of Cholula. Doubtless the number within the more important state of Anahuac, embracing the plateau of the Mexican capital, was still greater. Torquemada estimates the number in the empire of Montezuma at forty thousand!

Plentiful distribution of such structures in Cholula.

Bernal Diaz, the old Spanish historian of the times, and Cortez himself in his letters to Charles V, have given us full descriptions of the striking religious edifices and ceremonials with which they came into contact.

Perhaps the most elaborate structure in all Mexico at the beginning of the sixteenth century was that which Cortez describes from the capital. It was in the center of the ancient city. The inclosure of the outer walls was so great that Cortez estimates the interior capacity as sufficient for five hundred houses. Another estimate made by Solis is that the space inside of the walls and between them and the pyramidal foundation in the center was sufficient to accommodate ten thousand dancers on days of solemn ceremonies. This whole space was paved with dressed stone, and so smooth was the work that as Bernal Diaz declares, "the horses of the Spaniards could not walk upon it for slipping." All the area within was sacred territory. It was the central institution of the state, religiously, educationally,

Particular features of the Aztec temples of Mexico.

and politically. Here the priests had their abode. Here the soothsayers and scribes of the ancient epoch congregated; and here the emperor himself was admitted only with a ceremonial. The terraces constituting the pyramid were five in number. The broadest platform was three hundred feet square, and the height of the whole to the upper terrace was a hundred and twenty feet. On the top were two shrines, or towers, which were dedicated to the gods of preservation and destruction.

Central America, as well as Mexico and the countries of the North, abounds in ruins and monumental evidences of primitive peoples. The style of building was here the same as on the Mexican plateau, but there is a greater display of art. The Central American pyramids are generally smaller than the Mexican structures, but the temples on the upper terraces were larger in proportion. Great massiveness and strength are the characteristics of the masonry. The exterior of the temples were stuccoed and covered with carved figures and ornaments. It appears that the symbolical imagination ran rampant among the priests and architects. Within the temples were corridors and chambers with arched roofs of stone.

Central American ruins; likeness to those of the East.

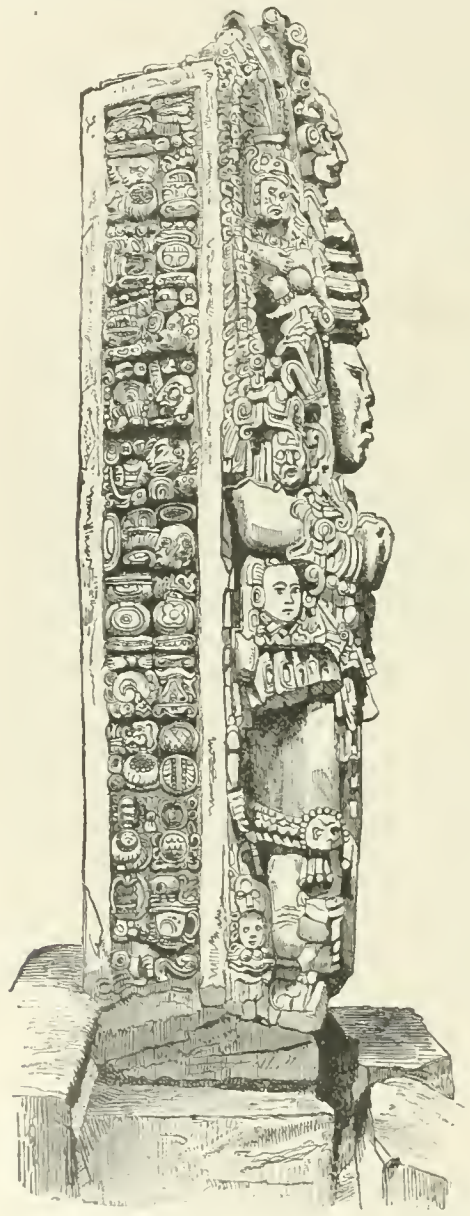
The antiquary in examining these ruins can but be impressed with their striking analogy to the earliest monuments of the human race in the valleys of Western Asia. The corridors and walls of the inner chambers are covered with sculptures and hieroglyphics. It is not impossible that a truer understanding of the significance of these inscriptions may make the world better acquainted with the character and activities of the aboriginal races of our continent.

CENTRAL AMERICAN ANTIQUITIES—DOUBLE-HEADED FIGURE OF THE CASA DEL GOBERNADOR.

In Honduras, also, many monuments of the same nature have been discovered and described. Here, too, the carving is elaborate and elegant. At Copan one of the most striking monolithic effigies ever recovered from the ancient world has been found and preserved. Around the shores of lake

Monumental remains of Honduras and Colombia.

Nicaragua abundant evidences of extinct peoples are scattered, and wherever these occur they are found to be covered with inscriptions. It is believed that those in the vicinity of Copan are the oldest monuments that have yet been found south of the Rio Grande del Norte. In Colombia, also, the traveler ever and anon stumbles upon some relic of human workmanship of unknown origin. The ruins of a few edifices and monuments have also been examined in this land, but have not added materially to our knowledge of their builders.



SCULPTURE OF THE TOLTECS—FROM THE RUINS OF COPAN.

Passing southward into the highlands of Peru, we come upon additional evidences of the activity and genius of an extinct people. Perhaps the city of Cuzco affords one of the best fields for antiquarian research that may be found in the world. Hererra declares that there were aforetime in this city as many as three hundred temples, and from the nature and extent of the ruins the assertion seems to be well grounded.

Temples of Cuzco; sun worship of the prehistoric races.

As a general fact, it appears that the religious ceremonies of the peoples whom we are here considering—Mexican, Central American, Peruvian—were a form of that sun worship which has constituted the most rational idolatry of the human race. Nearly all the temples seem to have been built with respect to the sunrise; and in so far as the ceremonial of these ancient peoples has been recovered, it reveals the same features which belonged originally to the worship of the Chaldæans and Assyrians, primarily to the Zoroastrians of the Iranian plateau, and in a considerable degree to the primitive peoples of India. There can be no doubt that the rising sun, coming up majestically after the red dawn of day and ascending the eastern arch of heaven, triumphing over mist and shadow, and fleecy cloud and rainstorm, constituted the one tremendous object of adoration which impressed itself upon the imagination of the early races of men.

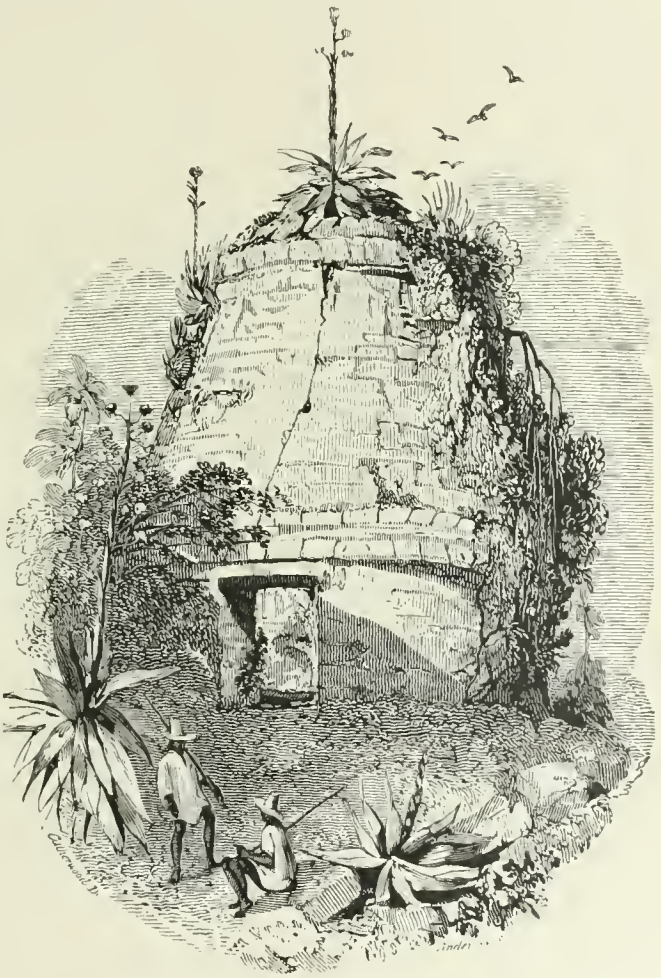
It must not be understood that the ruined monuments which we are here considering are the only memorials left

by the Southern races of the New World. The outlines of great cities are discoverable here and there. Some of these have survived to within the historical period. Others have gone down to indiscriminate dust. In connection with these ruins the outlines of public works are found in many parts. Not infrequently the antiquary is able to trace the course of a great aqueduct or of some other evidence of the labor and skill of a prehistoric people endeavoring to supply its common wants.

Sad estate of the people in prehistoric America.

It appears clear from an examination of all that we are able to discover in the regions here named, that man himself in his primitive estate was as much subordinated to ecclesiastical domination and political despotism as in the better-known countries of the East. It appears that the common lot was as hard and ignoble in Mexico and Central America, in Colombia and Peru, as on the Babylonian plain or in the stone quarries of Egypt. Even as late as the times of the Spanish invasion the condition of the common people was pitiable in the last degree. The life of the individual man had no splendor or renown. Cortez and the Spanish story-tellers who accompanied him on his expedition speak of the miserable houses in which the people lived. They were mere huts built of bamboo and covered with thatch, temporary protections against a climate never severe and always inviting to outdoor methods of life. All vestiges of such lowly abodes have long since passed away. Nor are there other means of discovering the daily life of the common people whom the merciless and bloody waves of Spanish conquest totally engulfed.

If we again turn our attention to the regions north of the Rio Grande, we

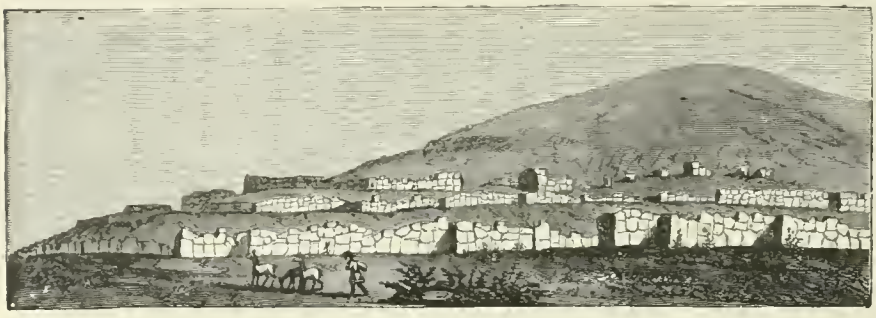


CENTRAL AMERICAN STRUCTURE—CIRCULAR EDIFICE AT MAYAPAN.

shall find in Arizona one of the best fields of exploration for the relics of a prehistoric people. This is not said of the ruins which the Spaniards and their descendants left in this region after the beginning of the sixteenth century, but of prehistoric memorials found in several localities. On the Colorado plateau

Extinct cities of the Colorado plateau.

there are traces of extinct cities, reservoirs, terraces, and aqueducts. Still more notable, in the valley of the Gila are scattered the monumental vestiges of a vanished race. Along the river banks are the outlines and actual débris of stone houses and military fortifications which belonged to a people long anterior to the European conquerors who came with Cortez and his successors. There are in many places, in a sort of fastnesses which seem to have been selected with not a little care, the remains of human habitations in great numbers cut from the native ledges, and constituting a species of abodes which are in good measure without an analogue among the habitations built by men. In other places walls of solid masonry, generally rectangular in form, may be traced; and the foundations of buildings which are thought to have been two or three stories in height are plainly discernible in many localities. It can not be doubted, indeed, that along the river Gila in past ages, as well as in many other parts of the territory of the United States, of Mexico, and of South America, a great and even flourishing prehistoric population existed, of which the only record is in the crumbling monumental remains which are left behind.



QUICHUAN ARCHITECTURE—REMAINS OF FORTRESS WALLS, AT CUZCO.

If we attempt to discriminate among the ruins of Southwestern North America, of Central America, and of Peru, and to decide what proportion of them are referable to the activities of the races inhabiting the Western continents since the New World was revealed to the European nations, and what part are the work of the prehistoric races which preceded them, we shall be likely, from the imperfect data in our possession, to fall into error and misinterpretation. Enough is known, however, to determine the general proposition that some of the monuments in question are the work of primitive peoples long anterior to the epoch of Spanish conquest.

Chronological relations of the ruins of the Southwest.

It is probable that Peru, or what was anciently Upper Peru, but is now included in the state of Bolivia, furnishes the best basis for the study of the truly prehistoric memorials in the regions which we have been considering. Since 1864, when the monuments of this country were explored and described by the American archæologist Ephraim George Squier, it has been settled that the relics of man's work in the high places of Upper Peru are traceable in their origin to a race that flourished in the country long before the era of the Incas.

The monuments in question are situated on the Andean plateau, high up in Bolivia, on the shore of lake Titicaca. The early Spanish invaders were greatly surprised at the character and extent of these remains. At the time of the invasion of Pizarro, they differed little from their aspect at the present time.

Remains on lake Titicaca; character of the region.

The region is a broad, open, arid plain. During the wet season the weather is cold, and becomes still more so as the dry season of the year approaches. No fruits or grain will grow in this vicinity. It is said that nothing edible has been produced in the region except a small variety of bitter potate. It is, perhaps, the only region in the world where great monumental remains are found in a situation wholly unproductive, and many conjectures have been advanced to explain the anomaly. It has been thought that perhaps the great people by whom the monuments which we are now to examine were created had profound superstitions or religious ceremonials which they celebrated on this almost desert plateau. It has even been suggested that the site of these monumental remains may have been determined by augury—as the site of Rome was fixed—and that superstition thus determined the place where vast structures were created against the laws and suggestions of the natural world.

The monuments in question consist of stonework and moles of earth. The stones are either rudely hewn into shape or selected and set up without dressing. The inquirer can not long have examined what is before him without discovering the analogy of the ruins to the great Druidical remains of England, and notably to Stonehenge. The stones are set erect in many places on the great terrace, but others are built into walls with the most exact workmanship. One of the most peculiar of the discoveries is that of heavy monolithic doorways. That is, large slabs of stone have been taken, and through these the temple entrances have been cut, with an arch above, while on the front, and even reverse, of the block are carved a multitude of symbolical characters. All over the plain are scattered, even for miles around, the relics of vast structures and battlements, the position of which can be plainly traced on the earth.

Stone and earthwork; the monolithic doorways.

PUEBLO STRUCTURE.—Ruins in the Valley of the Gila.

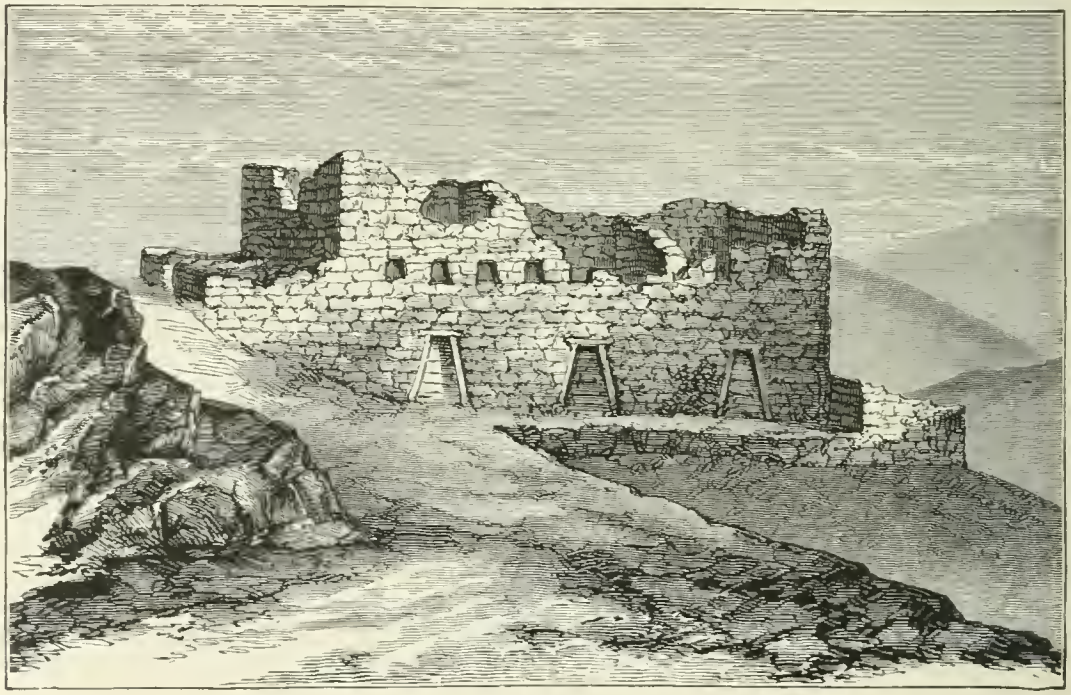
Among the monuments on this high

plain of the Andes four principal structures, or at least the foundations of them, have been developed from the ground. They are known to antiquaries by the names of the Fortress, the Temple, the Palace, and the Hall of Justice—from the purposes which conjecture has assigned to them respectively. The greatest of the ruins is the Fortress. It rises in the center of the plain, terrace on terrace, to the height of fifty feet. The mound is rectangular, having a base measurement of six hundred and fifty feet in length and four hundred and fifty feet in width. The faces of the terraces are laid with massive stones, which are carefully and skillfully cut and dovetailed the one into the other in such a way as to make them immovable for ages and ages. On each side, running out from the base, is a vast stone platform, known in architecture as an "apron," in which the masonry is as substantial as that in the faces of the terrace.

Astonishing character of the ruin called the Fortress.

If the traveler takes his stand on the summit of this tremendous monument and looks to the north, he finds at a short distance another rectangular mound, measuring at the base four hundred and forty-five by three hundred and eighty-eight feet. The outline of the structure is marked by rows of stones set erect in the earth, some of them as rude as those of Stonehenge, and others carved with skill. These are the outer supports of the structures which were reared within. Some of the monoliths are as much as fourteen feet above the earth, and are something more than two by four feet in their other dimensions. This is the structure to which antiquaries have given the name of the Temple. The Palace next attracts the attention, and is specially noted for the excellence of the stone cutting which is observed in its

Features of the Temple, the Palace, and the Hall of Justice.



OLD PERUVIAN STRUCTURE.—Ruins of Fortress, on Titicaca Island.

foundations. No masons of ancient or of modern times have, perhaps, excelled what was done on this arid plateau before the dawn of history, and is still preserved in the foundations of the monument under consideration.

It is not far from the outer limits of the Palace, so called, that the Hall of Justice is situated. It also is rectangular in its ground plan, being four hundred and twenty feet by three hundred and seventy feet in dimensions. Within this inclosure has been developed the foundation of still another structure, called the Sanctum Sanctorum, one hundred and thirty-one by twenty-three feet in measurement, which presents the finest stonework of all. For the excellence of the cutting and fitting it may well be compared with the ruins of Baälbec. Some of the stones are twenty-five and a half feet long, fourteen feet broad, and six and a half feet in thickness. They are fitted by the best rules of geometric art, and are held in place by bronze clamps that may well be compared with the like devices found in the ruins of ancient Egypt.

In the current chapter we have done no more than glance at the monumental remains of the three Americas. It is believed, however, that the fragmentary sketches of these memorials will be sufficient to convey to the reader a fair apprehension of the times and the people in which and by whom they were created. The present volume is by no means a work devoted to antiquarian research. It is merely intended in the present book to present so much of the primitive history of mankind as shall furnish a satisfactory basis for the consideration of the great tribal migrations which are to occupy our attention hereafter. We have in the preceding chapters reviewed the conditions of aboriginal life as they have presented themselves in the caverns and wilds of Western Europe, along the shores of the Baltic, in the tumuli of Great Britain, and in the mounds and among the monuments of the New World. We shall now conclude this book with a brief sketch of the general conditions of savagery as the same are presented among the barbarous and half-barbarous races of the present time. It is believed that the prehistoric man will thus be better *realized* in his far-off career by being seen in a reflected form of activity among the savage tribes and nations of the modern world.

Purpose of this treatise and of the sketch to follow.

CHAPTER XXI.—GENERAL CONDITIONS OF SAVAGE LIFE.

A TRUE understanding of the prehistoric condition of mankind depends in good measure upon a knowledge of the manners and customs of the existing savage nations. These nations are to be looked upon as the remnants and representatives of an ancestry like themselves. Doubtless the existing tribes have been much deflected in the course of ages from the original types to which they belonged. But it is also true that they have preserved many of the leading features of the original barbarism which has prevailed in all parts of the earth.

Viewed from the animal side of exist-

ence, the barbarians of to-day hold exactly the same relation to the dead races that have preceded them as do many of the living species of animals to the extinct varieties from which they are descended. The mammoth and the mastodon and the hairy rhinoceros have their living representatives in the elephant, the Asiatic rhinoceros, and even the common swine. There has been an evolutionary descent by which the tides of life have been turned aside into new channels. The living creatures are not the same in stature, in habit, in aspect or mode of life as the extinct types from which they have been derived. But the essential nature of the original species has been, in large measure, preserved.

MAN AND WOMAN OF THE REINDEER EPOCH.
Drawn by Emile Bayard.

So also of the different varieties of men, aboriginal, intermediate, and modern. Sir John Lubbock has declared with great force that the inhabitants of Van Diemen's Land and Terra del Fuego are to the prehistoric races of the age of stone what the opossum and the sloth and the kangaroo are to the extinct marsupials, known only to the geologist. The flint weapon in the hands of a living savage is to an antiquary precisely

what the horn-crowned nose of a rhinoceros or the projecting tusks of a boar are to a naturalist. The first carries the mind back to prehistoric implements found in the peat bogs of Denmark, and the other reminds the inquirer of the hairy rhinoceros and the tremendous tusks of *Elephas primigenius.*

Relations of existing races to their barbarian ancestry.

ducible to two general considerations which are easily apprehended. The first of these is what may be called the appearance of national consciousness among a people. Whenever this happens—whenever a given tribe begins to be conscious of itself—the national tongue will for the first time find utterance, and this utterance will take the

BEGINNINGS OF METALLURGY.—A PRIMITIVE SMITHY.—Drawn by Emile Bayard.

One of the first inquiries with which we have here to deal is the fixing of a line between the prehistoric and the historic races of men. What is it to have been a truly prehistoric people? and what is it to lie distinctly within the historic era? The answers to these questions involve several matters of much importance and interest, but they are all re-

Demarkation between prehistoric and historic races.

form of narrative. The narrative may be in the form of epic poetry. It may be a half-formed anthropology or cosmology, or it may be rude annals, reciting fragments of tradition and filling up the spaces from imaginary materials. At any rate, it is *History.* It is the earliest development in the form of language of a nation's concept of itself and of its own past

History may thus be regarded as the first rational transcript of the national consciousness of a people. There is that in the mind, whether of the individual or of the tribe, which on coming into the conscious state immediately demands some kind of narrative of its own origin and previous development. When this stage in the human evolution is reached, written records appear as a concomitant and inseparable incident of that particular epoch of growth. Henceforth we have the beginnings, at least, of those annals and early chronicles and traditional forms of literature which constitute the fundamentals of formal history. This circumstance may be taken as the first great point of division between civilization and its antecedent barbarism.

The conscious man requires an explanation of the past.

The second point has already been alluded to in the preceding chapters. It is the *use of metals*. So much stress would not be laid upon this fact in the progress and development of mankind were it not for the coïncidence of the use of metals in the practical arts with the beginnings of history referred to above. It is a part of the general scheme of the civilization of mankind that this fact of the appearance and first expression of a national consciousness in the form of annals and recorded traditions shall be associated under law with the earliest discovery and application of the metals to the purposes of human life. The metallic age, if we may so express it, is coïncident with the dawn of epic poetry and the first records of legend and tradition. When the primeval man emerges from the shadows of barbarism he begins to sing and to carry a metallic battle-ax. Thus it appears that the manufacture of the metals by rational or empirical processes, and their use instead of the ruder materials employed in the age of savagery, is the second circumstance which determines the line of demarkation between the civilized forms of life and the preceding barbaric ages. In other words, the line which is drawn between the savage and unconscious state of the human race and its conscious and enlightened activities has history as one of its points of departure and the use of the metals for the other.

Use of metals coïncident with historical consciousness.

The question will at once arise whether savage nations have no traditional forms of expression. Undoubtedly they have. All tribes of men, in however low a condition of development, cultivate legend and tradition. They are fond of reciting stories about themselves and the other races with whom they have come in contact. They are even as children telling unthinkable things about wolves and bears and giants. But the point to be observed is the *impermanence of the traditions of barbarism*. Contrary to the popular apprehension, the legends and stories of really prehistoric peoples are exceedingly evanescent. They generally pass away with the current generation, or at least take a new form with the succeeding one. The absence of a record to preserve and crystallize the myths and imaginations of primeval man is the circumstance which prevents their perpetuity. Each age among barbarians has its own cycle of traditions, but they have no continuance or fixed form. All the legends of savagery combined would be no other than the babblings of the living generation, or at most the transmitted form of the babblings of their fathers and grandfathers. It is now a well-ascertained fact that the most apocryphal stories told by savages pretending to give an account of past events in which their own people have

Evanescent character of barbarian traditions.

borne a part, are only the current expression in a magnified and distorted form of things that have happened within easy reach of the memories of men.

Instances of want of race memory in savages.

Many instructive and even amusing illustrations may be given from the annals of current savagery of the valueless and short-lived character of barbarian traditions. In November of 1642 Abel Janssen Tasman discovered the island which now bears the name of Tasmania, southeast of Australia. The people passed under the dominion of the Dutch, and the vicissitude was as great as could possibly happen to a barbarian race. In 1770, a hundred and twenty-eight years after the discovery of the island, the great navigator James Cook visited the Tasmanians and acquainted himself with their traditional knowledge. He found nowhere in the island the slightest evidence of a recollection of Tasman's visit. Every trace of that great event had lapsed into oblivion. Another instance of like sort is furnished in the great inland voyage and exploration of De Soto through the gulf region of the United States. Long before the Revolution all remembrance and tradition of this event had passed from the minds of the Red men. On being questioned, the most intelligent chiefs in the region through which De Soto had passed were found to be totally ignorant of the romantic expedition which had laid their own country open to the aggressions of another race.[1]

Transformation and early extinction of barbaric legends.

It is clear that three or four generations constitute the limit to which a knowledge of even great national catastrophes is transmitted among savage peoples. Even during the continuance of a tradition in barbarism it takes on constantly new and exaggerated forms, rendering it totally unfit for historical purposes. The imagination of the aborigines adds to and modifies the narrative until it is distorted out of all semblance to the original. It is narrated by Sir Alexander Mackenzie that during his travels among the Esquimaux they were wont to describe the English to him as giants with wings. They said that the English soldiers could kill men by looking a' them, and that one of them could swallow a whole beaver at a mouthful! The traveler Mansfield Parkyns, in his account of the traditions of the Abyssinians, relates one of their stories to the effect that some German missionaries had in the course of a few days made a tunnel from Adowa to Massowah, on the Red sea, a distance of more than a hundred and fifty miles! In fact, all of the traditions and myths of savage tribes are apocryphal in the last degree; and this fact, taken in connection with their impermanence, destroys all value that they might otherwise possess for the antiquary and historian.

While it is true that barbarous traditions are thus useless for purposes of history, and misleading if depended on to throw light upon the general conditions of savage races, it is also true that the manners and customs of these same races are among the most persistent facts which the student of human life will ever encounter. A tradition or legend will change its form like the figments of the kaleidoscope. It will vanish with a

[1] The impermanence of the traditions of savages is strongly contrasted with the persistency of tradition *after* a race has once entered the conscious stage of development. When a tribe has reached the epoch of race consciousness and has begun to employ the metals in manufacture and art, then its traditions become permanent and of high historical interest.

brief lapse of time and never reäppear. But the manners of even wild and roving tribes hold their form through every vicissitude and long generations.

Persistency and integrity of customs and habits.

Nothing is better calculated to astonish the inquirer than the persistency and integrity of customs. They can hardly be destroyed. They pass through the severest crises, and come up after great catastrophes in all their pristine vigor and definiteness of outline. Even the trivial circumstance of a peculiarity of tribal speech will be perpetuated from generation to generation, and the more substantial elements of custom seem to endure forever. Habit is, if possible, more unchangeable with a tribe or people than with the individual. It seems to be a part of the blood and nerve of national existence. It goes through shocks and revolutions, through migration and famine, through the ravages of pestilence and the horrors of war, and is indeed coëxistent with the race of which it is a part. A trivial custom easily outlasts the life of man. It survives the mountain oak which has braved the storms of a millennium. It outlasts the granite obelisk which the conceit of a mistaken people has reared as the most permanent memorial of its greatness.

PERSISTENCY OF ETHNIC FEATURES.—(1) ANCIENT HEBREW SHEPHERD WITH SLING.—Drawn by H. A. Harper.

There are still present in human society forms and customs and peculiarities—modes of action and ceremonial habits—that have been transmitted to the modern world from the shadow and obscurity of the unknowable ages that lie below the daydawn of civilization; and in like manner the present will contribute to the coming ages its customs, its methods, and its ceremonials.

If we would see a striking illustration of the persistency of manners and customs, we have only to glance at some of the modern descendants of ancient nations. The Semitic race, for instance, presents us in modern times with two striking race developments. The Jews and the Arabs still stand as the typical representatives of a family of men already old at the birth of most of the ancient kingdoms. In the case of the Jews, their dispersion among other peoples has to a considerable extent conformed them in the practical affairs of life to the methods and manners of those among whom they drift, but with whom they are by no means amalgamated. So we may look to the Arabs of the present time as the living expression of those ethnic forces which were dominant in the seed of Abraham. No one who acquaints himself with Arabian manners and customs, and is at the same time conversant with the manners and customs of the Israelitish nation of antiquity, can fail to notice that the forms of life among the Arabians of to-day are identical with those of the Hebrews fifteen centuries before the Christian era. The very garments which the Arabs wear might have been stripped from the bodies of the patriarchs. Their fashion is the same, and the material and its method of manufacture are to all intents and purposes identical. The ceremonial of the house and the tent are just as they were in Canaan before the Egyptian bondage. An Arab sheik meeting another clad and mounted like himself and each followed by his retinue across the deserts and valleys of Arabia, might be photographed and the matter and the manner of the interview repeated, and both would be a faithful transcript of the meeting and compact between Lot and Abraham.

Examples of the preservation of Semitic manners.

If we descend into the particulars of speech and the manners of daily life among the Arabs we shall find the ancient ceremonial faithfully duplicated. The forms of salutation and of farewell have persisted in their integrity for more than three thousand years. The same views of life—of its origin, its nature, and its destiny—the same ideas of duty and obligation, of the nature and

PERSISTENCY OF ETHNIC FEATURES—(2) MODERN ARAB WEARING THE ABA.
Drawn by Paul Hardy.

Daily life of the Arabs a transcript of that of the Hebrews.

immediate presence of a personal deity interfering with the affairs of the common lot and directing even the details of all events, are to-day in the Arabian mind and on his tongue and in his actions with all the realism and vitality and distinctness which those same ideas possessed in the minds of the great military leaders and prophets of primitive Israel. The Elohim of the Hebrew is the Allah of the Arab. The appeal to the one for the protection of his tribe and victory over the enemy is as constant and confident in the camp of the Arabian chieftain as was the appeal to the other in the tent of Joshua or Saul.

Common religious views of modern and ancient Semites.

To the ancient Hebrew and to the modern Arab alike this Allah, this almighty personal God, directs everything. He brings pestilence, and is the giver of health. He blesses and curses according to the righteousness or the wickedness of his people. He speaks to the sleeper in dreams. The dream is only the voice of God in the darkness. Years of plenty and years of drought are both from his hand. He ripens the grain to a perfect harvest or blasts the fields with mildew. He sends the early and the latter rain when the people have been obedient, or the murrain and the locusts when they have disobeyed. All this and ten thousand other things which, taken in their entirety, constitute the tangible outer garment of Arabian life, are in manner and substance virtually the same at the present day as they were among the captives who sat down and wept by the rivers of Babylon, or among the strong soldiery who followed the banners of the Maccabees in their last struggle for independence through the wilderness of Judæa.

Were we equally well acquainted with the tribal history of other races the same phenomena — the same repetition in modern life of the manners and customs of remote antiquity— could be discovered and pointed out. Had we at the present a record of the boisterous manners and hilarious barbarism of the Teutones who hovered darkly in the forests beyond the Danube and the Rhine in the days of the early republic of Rome, we should be able to note the repetition and persistence of these customs among the Ostrogothic and Visigothic invaders who, many centuries later, devastated the empire. And were we well acquainted, as we are acquainted in part, with the primitive barbarians who inhabited the lowlands of Holland in the north, we should find their manners and customs preserved, not only in outline, but in detail and circumstance, among the broad-shouldered and florid Saxons who followed Egbert and Alfred in their battles with the Danes, and upon whose rugged nature still rests the superstructure of British greatness. The clatter of their ale-horns, the ring of their battle-axes, their barbarian laughter, and their snatches of savage song would be heard repeated in the jocular hilarity and boisterous mirth of Chaucer's bantering pilgrims, in the wild uproar and vulgarity of Shakespeare's taverns and battle-fields, and even faintly echoed through the mist and gauze of the refined and beautiful epics of the late Laureate of England.

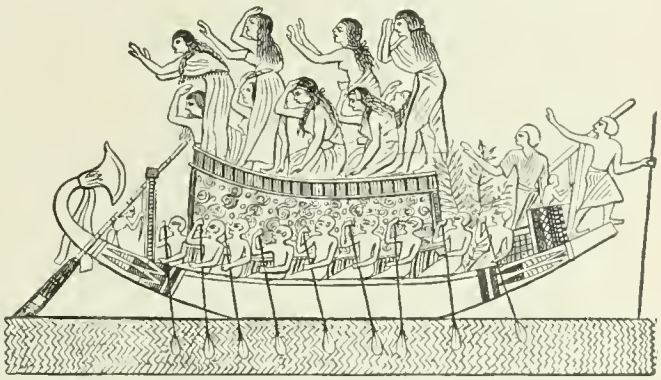
Primitive Teutonic manners have survived to present day.

By carefully weighing the foregoing considerations we are able to see the means by which the character and methods of life of prehistoric peoples may be in some measure comprehended. The inquirer will, of course, in the first place examine all the existing remains

Monumental remains the certain evidence of prehistoric conditions.

which the peoples of antiquity have left behind. A monument, unless misjudged as to its design and character, constitutes the fundamental evidence with regard to the men who reared it. It gives the only primary testimony, and may be relied upon with absolute faith as to its verity and significance.

Monumental remains are even more certain in their testimony, more absolute in their fidelity to the facts which they represent, than are the best historical writings produced by man. The latter are always in some sense warped from the image of truth. They bear the impress of the annalist or historian from whose brain they were evolved. They are tinged with a thousand prejudices of the passing age. But the monument is unconscious. It has no prejudices or passions. It belongs to no sect or party, and is unbiased in its evidence by any personal equation. No conscious force of human caprice has been impressed upon it. It stands in naked austerity a solemn witness of the purposes and genius of the people who reared it.



PERSISTENCY OF CUSTOMS—MOURNING WOMEN OF OLD EGYPT.
From the entablature found in the tomb of Ptah-Hotep, at Thebes.

In the second place the inquirer may, as we have seen, depend in large measure upon the fidelity of manners and customs. These have been perpetuated from age to age, and there is no doubt that the earliest, even the unconscious, movements of mankind on the earth are to a considerable extent reflected and portrayed in the existing habits of barbarians. Allowance must be made for the deflection of human nature under the influences of time and circumstance. It must always be remembered that the evidence in this case is not absolute and indubitable as in the testimony deduced from monumental remains. But manners and customs are, nevertheless, trustworthy indications of the past condition of the human race. Mere tradition may not be trusted. We have seen the absurdity and brevity of the legendary part of barbarian history. Traditional forms of thought, as they are passed from tongue to tongue among the barbarous tribes of men, have an independent interest of their own, just as the fictions and extravagant imaginations of children may prove of interest to the metaphysician and philosopher. But the story told by the child must not be accepted in the court of higher reason as an evidence of its own origin or the methods of its previous life. We are thus virtually limited in our inquiry concerning the prehistoric condition of men to the two general conditions here indicated, namely, the monumental remains which are preserved on the surface of the earth as evidences of the men who produced them, and the persistency of manners and customs among the peoples now inhabiting the world.

Deductions drawn from fidelity of manners and customs.

Another consideration here presents itself and demands a brief inquiry. It is the source or primary origin of barbarity. There is no doubt that in the remotest antiquity which we are able to

discover by means of ethnic, linguistic, and archæological study, tribes of men struggled for a precarious existence on the earth in a condition of the profoundest savagery. Nor is there any doubt that similar races still possess a considerable portion of the surface of our planet, living thereon in a condition of animality which must be seen in order to be realized in its profound abasement and savage degradation. But what is the origin of this degradation? How has it happened that men have come into such relations of depravity and gloom? In what way may the degrading barbarism of the ancient world or the equally low condition of the outlying savage races of the present time be rationally accounted for and explained?

Inquiry into the primary origin of barbarism.

Two principal theories have been advanced in answer to these questions. They are diametrically opposed in the views which they present of the history of the human race. The first is the theory of the descent of mankind from a primitive high estate to the fenlands of barbarism. In this view of the case the first condition of the human family was one of elevation, of refinement, of knowledge, of power. But from this high plane of primitive purity, excellence, and greatness mankind has descended to lower and lower grades of being until, in remote antiquity where the ethnologist first discovers the primeval peoples, they wallowed in savagery and degradation. The first age was the age of gold. Then came the lapse from the noble estate with which the race was started, the swift decline of the dispersed and broken fugitives, the loss of former reason and spirituality, until the gloom of barbarism settled around all the horizon of human life, and naked savages were seen by the river banks and in the shadows of the forest.

Two explanatory theories of the source of the barbaric state.

All the evidences of barbarism—so the hypothesis continues—which the historian and archæologist discover in existing and extinct races are but the results of this lapse and ruin of the human family. All the efforts which have been put forth for the elevation of mankind are only the broken and half-hopeless struggle to restore the human race to its pristine glory; and the heavy forces which impede the progress and the higher development of men are but the residual poison and malevolent habits which they have acquired, as they would acquire the infection of disease, in the course of their descent and the groveling of their low estate. Such in brief is the general view which has long prevailed relative to the origin of savagery in the human family.

Hypothesis of the descent of mankind from an age of gold.

Directly opposed to this hypothesis is the theory that the true original condition of men in the world was one of a low grade of animality, and that all subsequent movements of mankind have been along the lines of an evolution which is gradually lifting the human race through hard and tortuous processes to a higher plane. In some favored situations this evolutionary force has already, in different ages, brought certain peoples out of barbarism into the light of reason and at least the beginnings of civilization. In other places and under less favorable conditions the primitive state still abounds, and men have grown but little from the merely animal life with which they were projected into the world. All the movements of history, according to this hypothesis, have a common trend toward the production of a complete man and a perfect society.

Belief that the beginning of man-life was in savagery.

In the struggle to reach this end some peoples go to the front, others lag, and still others drop into nonentity. Some become self-conscious and display those high and generous activities which in the aggregate go by the name of civilization, and others remain on lower levels, or even in the original sloughs of barbarism. The civilized forms of life, according to this view of human history, are merely the survival and development of those better activities which have been found to be of benefit to the race.

BARBARISM ILLUSTRATED—ANCIENT FISHING SCENE.—Drawn by Riou.

It thus happens that when the ethnologist and the historian begin an examination of the past they find savagery as the bottom fact. The first discoverable men are rude hunters smiting wild beasts with weapons of stone, or half-naked fishermen dragging their nets and boats to shore on solitary coasts. The further the lines of human life are traced backward the more profoundly do they penetrate a world where reason is absent and bestiality prevails.

Elaboration of this view; arguments in its support.

Out of this primitive state the more vigorous of the savage peoples, by toilsome ascent and painful struggles, gradually emerge into conscious existence. They expand in their intellectual powers, invent superior forms of utterance and a pictorial representation of thought, write their words by means of symbols, record the story of their own deeds, mass themselves into strong communities, begin to reason about the origin of the world and the course of nature, and finally take up the chant of epic poetry. Which, then, of these two contradictory theories will better ex-

plain the existence and origin of barbarism?

Many arguments may be sincerely advanced in favor of each hypothesis. It is the duty of history to deal candidly with all questions, to have no prejudice and no fear. The time has arrived in the course of human events when the great problems of the past may be considered with calmness and courage. No blind fanaticism for one or the other of antagonistic theories should any longer sway the decision of an inquiry which is of so great an interest, and the solution of which in one way or the other can hardly change the great movement of mankind toward the higher developments and grander activities of the future. In behalf of the hypothesis of the descent of mankind from an original high estate into conditions of savagery, several facts and arguments may be truthfully advanced:

1. In the first place, the traditions of nations, especially in that part of their career when they have themselves just emerged from the barbarous condition, generally recount an original age of gold which their fathers enjoyed and in which they were the great participants. Nearly all the vigorous races of antiquity that played important parts in the ancient world had traditional beliefs of this kind. They looked back through the mists and obscurities of their own age and the ages immediately preceding to an epoch of splendor and renown in which their heroic fathers were seen afar as tall trees walking. All the early theogony and cosmogony of the ancients as depicted in their philosophical systems, their myths, their epic and dramatic poetry, were touched and flecked in every part with the traces of this belief.

Race traditions generally point to an age of gold.

It can not be well explained why the greatest peoples of the ancient world should have held and propagated such opinions respecting their ancestry and the state of society out of which they were descended, unless there had been some ground for such belief. Looked at as an abstract question, it appears more rational that the bards and myth-makers of the primitive world should have chosen to glorify themselves and the passing age by representing their descent as issuing from darkness and barbarism, rather than to picture themselves as degraded from a godlike ancestry. It is not certain in which way the half-conscious intellect of the primitive man would work or by what laws it would be guided in the development of traditional beliefs. But the fact remains that the greater part of the best teachers of antiquity *believed* themselves the offspring of a great paternity, and that back of the barbarities of their own age and the immediate ages of their fathers lay a resplendent age of gold, from whose heights and heroic activities men had descended by gradations into a low estate.

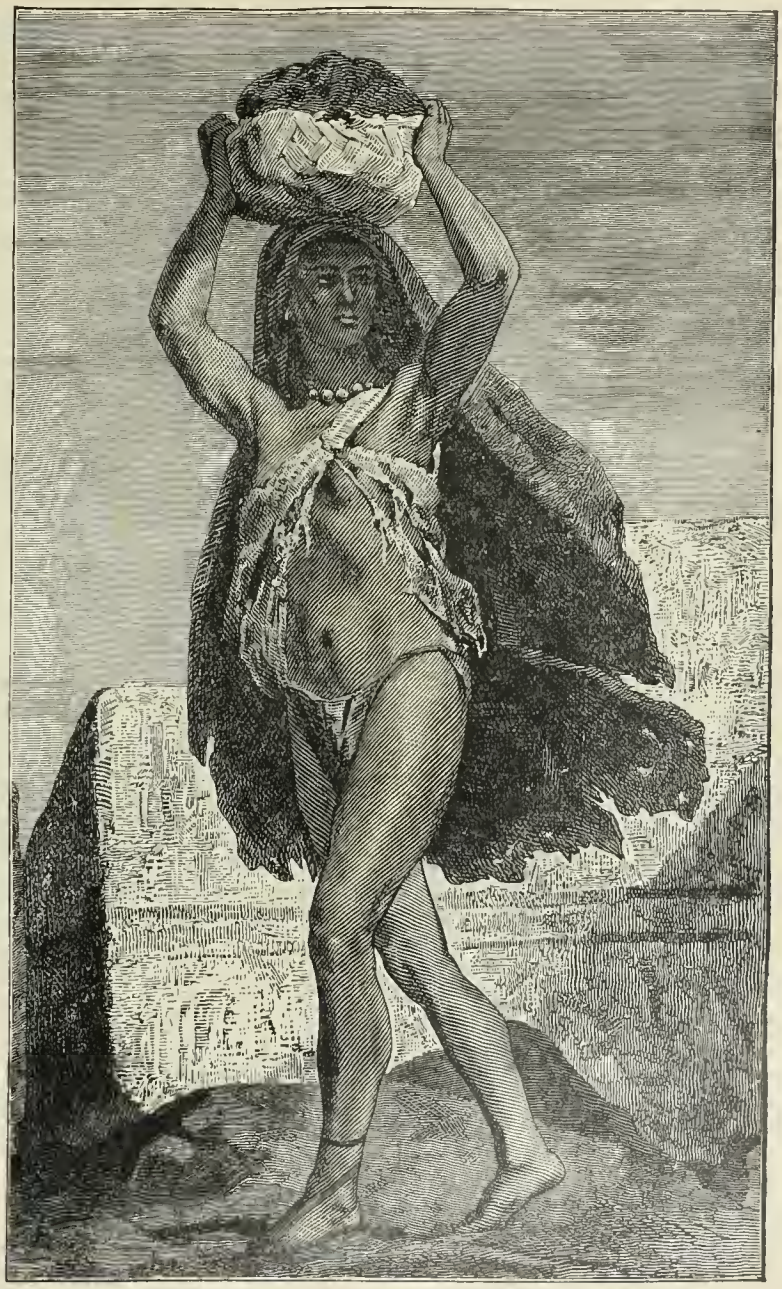
Difficulty of accounting for the prevalence of such a belief.

2. In the next place, it may be well urged that many nations within the historical era have actually declined from higher into lower conditions. In fact, all the great nations once in possession of the better parts of the world, once organized into tremendous communities, once filling the streets of magnificent cities, once directing the commerce, cultivating the arts and controlling the energies of mankind, once gathering into vast treasure-houses the resources of the world and sending forth invincible armies for the conquest of Gentiles and barbarians, have now disappeared from among the powers, and are known

Actual examples of the decline and extinction of races.

only by annals and memorials. It is also true that these great nations have, as a rule, not gone out by sudden eclipse and extinction, but they have rather fallen away by degrees, relaxed, insensibly at first and sensibly afterwards, their hold of power, and crumbled away until attack from without and feebleness from within have joined their forces to complete an inevitable downfall.

It is hardly needed to recite examples of national decay. It is almost superfluous to recount the tremendous domination once established in the valley of the Nile, now represented by Arab sheiks, miserable collections of degenerate Copts in squalid villages, and a few degraded fellahs plowing with oxen in the glebe by the river banks. The early Chaldæan empire at the mouth of the Euphrates has left only scattered monumental traces. The glory of the Assyrians and of the later Babylonians has passed forever from the valley of the two great rivers. The tremendous Turcomans, iron forgers at the first from the mines of the Altais, who came as conquerors into Western Asia, surrounded the city of Constantine and made it their capital, are now degenerated into the opium smokers and harem builders of the Bosphorus. The splendor of Athens and the glory of the Athenian intellect have



EXAMPLE OF RACE DETERIORATION—RUBBISH-BEARER OF EGYPT.
Drawn by Gustave Richter.

given way, through long ages, to foreign domination, and the traveler stands sad-hearted among the ruins of the Acropolis, or marks with astonishment the miserable goat houses built over the oracle of Delphi. The Rome of antiquity, whose solid walls of stone and tremendous legions clanking their armor on the stone slabs of the Appian Way have become only a tradition and a name, has shrunk from her ancient circuit of the hills to a commonplace city, the throne of superstition and conservatism, and haunt of beggary.

EXAMPLE OF RACE DETERIORATION—ROMAN BEGGARS.

3. The careful reader of the preceding pages will not have failed to note that many of the monumental remains of antiquity betoken unmistakably the energies and genius of a superior people. Some of the most primitive memorials of the human race are among the most convincing and substantial evidences of power and grandeur. The granite obelisks and pyramids of Egypt, the so-called Cyclopean ruins in Greece, the old Etruscan aqueducts, such as the Cloaca Maxima at Rome, the great military mounds and fortifications in North America, and particularly the Peruvian ruins on the plateau of the Andes, mark and emphasize the activities of races of

Monumental remains indicate the greatness of ancient peoples.

men hardly inferior to the strongest and most skillful known in history. It will be remembered that in many of these localities barbarism long flourished and ran rampant after the tremendous monuments reared by preceding civilized peoples had gone down to ruins. The Peruvian monuments were in their origin as far anterior to the domination of the Incas as the Incas are remote from the Peruvians of to-day. The earthworks and mounds of North America antedate the epoch of the Red men by a span of ages. The massive foundations laid by the Etruscans in their own district and in Latium are far more ancient than even the traditions of the primitive Latin race. So also are the Cyclopean remains of Greece far more remote than even the age of the heroes; and as to the monuments of Egypt, it is sufficient to say that the oldest of them are the grandest and most enduring.

4. In the fourth place, the evidence of language points to a primitive condition of mankind in which the intelligence and reason were the supreme characteristics. Whatever may have been the origin of human speech, it is clearly a rational product. The oldest languages with which we are acquainted are the most perfect in their kind. If we consider that great group which we call the Aryan, or the Indo-European, languages, we find them to improve as we trace up their descent toward their origin. This is to say that, as a rule, the older dialectical form is fuller, more complete, and more rational than its descendent derivative. The modern languages of Western Europe are, as a rule, devoid of grammatical structure, and are in reality rather the detritus of a perfect speech than the speech itself. The Anglo-Saxon tongue had a more extensive grammar, if not a fuller vocabulary, than the English of to-day. Mœsogothic was richer in inflections and rational forms than its descendent German. Latin was more inflected and developed than Gothic, and Greek preserved many of the forms which had already decayed and fallen out of Latin. Sanskrit was far more nearly perfect in its structure and inflections than any later Aryan tongue. With its eight cases and three numbers for nouns, with its full verbal development and its inflected adjectives, it stands to-day as perhaps the most complete structural expression of human thought. Thus we see that the higher we trace the streams of the Indo-European languages, the broader and fuller are the forms which we encounter. Not a trace of evidence is discoverable that any one of the multifarious languages descended from this common source had an origin in barbarian ejaculations, or in any form of irrational utterance. And if we look still more closely into some standard form of this speech we shall find that it has been evolved by the logical processes of abstraction and generalization, the noun being derived from the verb and the adjective from the noun, by an evident effort to abstract a substance or thing from an action and a quality from a substance.

Language seems to have begun in an age of reason.

It will thus be seen that many reasons may be assigned for accepting and perpetuating the old-time beliefs of the human race in the splendor of its own ancestry and the reality of the age of gold. But, on the other hand, many reasons may be given for rejecting such belief and putting in its place the hypothesis of an ascent from barbarism instead of a descent from heroes, Titans, and gods. The principal arguments in

Arguments may be advanced in support of opposing theory.

favor of the theory of savagery as the original condition of mankind may be stated as follows:

1. Our first actual historical knowledge reaching into the past touches only conditions of barbarism. To the historian or ethnologist the primeval state of man, as seen from his point of view, appears to be one of savagery. It is true that many nations are discovered in the far horizon of antiquity that on our earliest acquaintance with them appear already in a state of intellectual activity and swift progress toward the civilized forms of life. But close scrutiny will discover *just behind them* a lower tribal condition, and behind that a still lower. In other words, the peoples who on our first acquaintance with them appear in a state of progress and development have, manifestly, been borne forward by evolutionary forces out of barbarian conditions only a little more remote than the peoples themselves. Such nations as the primitive Greeks were evidently resultant from an agglomeration of semicivilized tribes who, settling down from migratory habits, entered into union with each other and began to develop into rational activities. So also of the Roman gens in Latium and other parts of the Italic peninsula.

Backward look of history reaches barbaric beginnings.

BARBARIAN LIFE ILLUSTRATED.—Chase in the Age of Bronze.—Drawn by Riou.

All this is a statement of the case as it stands in the backward vision of the historian or ethnologist. His actual acquaintance with the races of men can not well penetrate beyond the conditions of savagery *which he sees*, and ascend to a primeval of intellectual elevation and

social happiness which *he does not see*. He need not deny the existence of such a primitive state, but his discernment can not reach it through the intervening darkness.

2. Not only is the first discernible condition of mankind one of barbarism, but the evidence of an emergence therefrom is abundant. This is to say that under the eye of history early peoples, savage or half-savage in their manners, are in many instances *seen in the actual process of evolution* toward the higher form of rational existence. No condition in the primitive annals of mankind is more certainly established than the fact that peoples *do improve*. They are seen to do it. If we measure the condition of a barbarous tribe and compare it with the condition of the same people after a century or two centuries of growth, we can easily discover the process of evolution and its results.

Races are discoverable in the actual process of evolution.

It must be confessed that the improvement of barbarian races is in many cases slow-paced, scarcely noticeable after the lapse of a long period. It may even be admitted that many barbarous peoples have not improved at all. It is probably true that the original forces with which some tribes are impressed are not sufficient to bring them out of the savage state. They continue as they were from age to age. They become as fixed in their habits and methods of life as are the birds and beasts. They build as the beaver builds, and the concept of a higher state is totally wanting in their understanding. But in most instances there is a forward march—slow it may be, but still a movement that may be seen and measured.

Slow rate of race emergence from primitive savagery.

History is filled with illustrations of human development. Tribes become peoples. Peoples become states and kingdoms and nations. The expansive force of the social and civil instinct in man is seen working powerfully in the evolution of higher forms of activity and better expressions of right reason. The whole story of the human career is in good part a story of progress, amelioration, development. It is the law of life. The human race shares it in common with all other forms and modes of existence. Aye, it is most manifest in man. In him the evolution is strongest, and the tendency toward a higher state—the dream of something beyond and above—is always discernible in his actions and language. The roving tribes in ancient Hellas became the bronze-clad warriors of the heroic age. The returning warriors became the rhapsodists and orators of the age of patriotism; and the rhapsodists and orators became the philosophers and poets of the most intellectual epoch of the human race. The robbers gathered on the Capitoline Hill plant a city and organize a state. Their wolfish manners give way to the culture of the market place and the early forum. Another evolution, and we see the senate-house, the tribune, and the temple. Still another, and the marble-built city, with its marching armies and citizens in toga, its columns, its busts, its trophies, its roaring circus with its multitudes are seen — finally the domination of the world.

History replete with examples of human development.

In subject Gaul the half-savage and wholly barbarous Franks hoist their chieftain on their shields, and Clovis appears as the primitive king of a primitive people. Further on are Charlemagne and his school of the palace. Already they are reading the annals of the past, sending polite messages to Haroun-al-Rashid,

The Greek evolution paralleled with that of the Gauls.

and studying the stars. Still further on, Godfrey and Raymond and Saint Louis gather their helmeted warriors and, under an ideal enthusiasm, would rescue the tomb of the Christ from barbarians and infidels. Further on stands forth the French nation, breaking the fetters of feudalism, rising through the bloodiest of revolutions into a splendor and freedom hitherto unknown among the peoples of the earth—Napoleon the Great, his conquering armies, victory, renown, the republic.

THREE STAGES OF CIVILIZATION ILLUSTRATED—SKETCH FROM FORT LARAMIE.

In the oak woods of primeval Britain are the barbarian Saxons gathered around their chiefs. They have filled themselves with raw meats, coarse cheese, and fiery drinks, but they found their petty states — a heptarchy of possibilities. Then come Egbert and Alfred and the foundations of the immovable kingdom; the Conqueror; Chaucer; the mediæval splendor of the Plantagenets; the greater glory of Shakespeare and the bards; the establishment of liberty by war; overthrow and rebuilding; emergence; English liberty; the colonization of the world; the triumph of letters and art.

Rise of the Saxon race from barbarism to greatness.

Everywhere the story is the same. Progress and development, the first law. Foundations are laid; then comes conquest, first of savagery and then of the forces of nature—the bending down of the tremendous energies of the material world to the purposes of human will and endeavor—the mastery of the earth and its fullness. All these are the very law, the fundamental method of human existence on the earth. These facts are palpable. They are seen and touched. They are known and manifest; and in so far as they are the demonstrable rule by which mankind are guided, it appears undeniable that the history of humanity is the history of a development from a

lower into a higher form of life—from barbarism to civilization.

3. In the third place it must be acknowledged that the condition into which many civilized nations have fallen and relapsed is a condition *very different from that of primitive savagery*. It would seem that nations having once occupied a high plane of political and intellectual power do indeed lapse into effeminacy, vice, slavery, and moral degradation; but they do not become barbarous or savage. We should look in vain for a single instance in which a civilized people, whether of ancient or modern times, has fallen back into an aspect of life at all analogous to that of the cave dwellers of Europe or the Red men of North America. They do indeed relapse. The heroic Greeks of the fourth century B. C. have become the degenerate weaklings of modern Greece. The Romans of the sturdy republic have left as their descendants the mendicant musicians of Florence, the dirty boatmen of the Venetian canals, and the lazzaroni of Naples. The Spanish warriors and navigators of the fifteenth and sixteenth centuries who found a new world and took it for their sovereign, have as their living representatives the mandolin players of Cadiz and the brandishers of stilettos in the half-lighted streets of Madrid. The evidence of retrogression and decay is sufficiently striking to the philosopher and painful to the philanthropist. But the modern Greeks, the Italians, and the degenerate Spaniards of to-day have no likeness or kinship with the savage races whom we discover on the further confines of history. This is to say that the ascending and descending phases of national life present wholly diverse aspects; insomuch that one can scarcely be compared with the other. The true savage appears to have in him the potency of the time to come, while the effeminated and degraded descendant of a great ancestry has in him only the potency of death. In so far as this dissimilarity between the barbarian, under the influence of forces that may bring him into the civilized state, and the depraved posterity of great ancestry does exist as a fact, it seems to be an evidence of the original barbarity of all peoples and the evolution of a few into the higher forms of life, rather than an evidence of the relapse of races into original savagery.

The fallen estate of races differs wholly from savagery.

4. The believer in the hypothesis of an ascending movement of human nature from a primitive savage condition into light and freedom and greatness, may well urge that the great monumental remains of the remotest antiquity and the perfected languages which we find at the daydawn of civilization are the work of races which had already *passed through the stages of development* from original barbarism to the higher conditions of life. In our present state of knowledge it would be rash to allege that the striking memorials of civilization belonging to the remotest antiquity are certainly the work of peoples who had been developed from savagery through preceding ages of discipline and endeavor; but it would be equally rash to allege that such memorials of primeval greatness are the work of nations who *began* their career in civilization and enlightenment. So also of human speech. It is true that such languages as the Sanskrit appear as the highest grammatical and logical formulæ which have ever been invented for the expression of human thought, and that subsequent linguistic developments have been, so far as the structural forms of

Monuments and languages have behind them low conditions.

speech are concerned, retrogressive rather than progressive. But no one can say that the apparition of Sanskrit was not itself the result of preceding ages of progress and development.

On the whole, it appears rather against right reason than in conformity with what we know of the human mind and its principles of growth to suppose that a vast structure of speech like the Sanskrit should come forth at one effort from the brain and tongue of a perfect race. It would seem too much a marvel that the Aryan house-folk of the primitive Indian valleys should have *begun* to speak with the perfected formulæ of language. It is not alleged that such a phenomenon is impossible, but the development of a language from small beginnings and in constant correlation with the opening powers of the mind seems to conform more nearly with the progressive order of human nature and of universal nature than the sudden phenomenal efflorescence and fruitage of a full-grown language.

Not reasonable that perfected languages began at once.

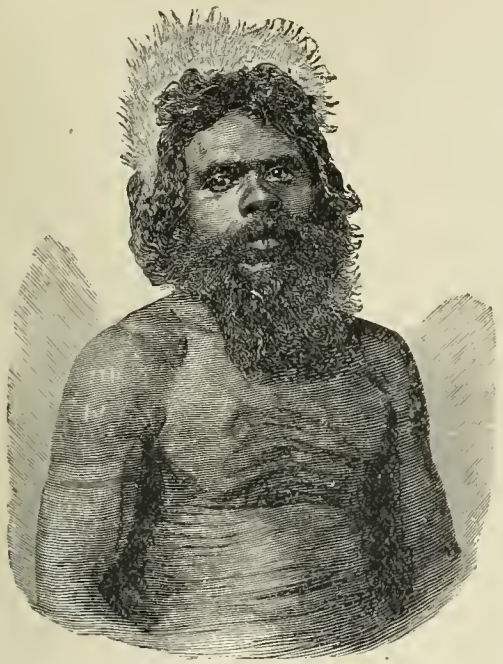
Such, then, are the principal arguments for and against the theories which have been advanced to explain the fact of barbarism. Both views of the beginnings of the barbaric life have been sustained with such hot contentions as are born of preconception. The historian may frankly admit that the arguments on either side are weighty and important, and if for the present he suspends a judgment, it will not be thought to proceed from a reluctance to decide according to the evidence before him, but rather from the incompleteness of the data thus far attainable. Meanwhile the argument strongly preponderates toward that theory which makes barbarism and savagery to have been the primitive condition of mankind, and civilization to be the resultant of the slow processes of ethnic evolution. The statement of the various reasons for and against such a view presented in the current chapter has been given as a digressive study, preparatory to a notice of some of the general and actual conditions of barbarism, and to that great topic we now turn our attention.

CHAPTER XXII.—BARBARISM ILLUSTRATED.

IT is painful to reflect how great a portion of the earth is still under the dominion of savage races. Europe, the smallest of the continents, has long emerged from her primitive condition. Large tracts of Asia have been occupied by civilized nations from a remote antiquity. A new world has within the last three centuries been reclaimed. A powerful race has planted itself in place of the scattered aborigines. South America has, within the current century at least, presented the redeeming aspect of Latin civilization. But the rest of the world is still dominated by races of men whose manners and customs lie close to original barbarity. The islands of the sea present some of the most striking aspects of this current savagery of mankind. Africa throughout nearly its whole extent is untouched with the sunshine of the higher life. The boreal regions, whether in the Old World or the New, are still occupied by races on a

Large areas of the world still dominated by barbarism.

very low plane of development. It is among such peoples that we must now seek and find our examples of existing



NATIVE AUSTRALIAN FROM THE DARLING RIVER (HEADDRESS OF FEATHERS).

forms of barbarity in illustration of the prehistoric life of man.

Filthiness of barbaric life; example of Hottentots.

One of the most striking facts in connection with the savagery of the human race is filth. There is perhaps no single example among aboriginal tribes of anything like cleanliness. Those dispositions which we observe in many birds and animals to plume and cleanse themselves and to protect their nests and lairs from the grosser forms of filth are strangely absent among the ruder savages. The historian Kolben has remarked of the Hottentots that they may be regarded as the filthiest animals in the world! Not content with the offensive accumulations of nature and constant contact with the dirt, they actually cultivate gross forms of defilement, rendering them in their personal habits repulsive and disgusting to the last degree. In his description of these heathen the author says: "Their bodies were covered with grease, their clothes were never washed, and their hair was loaded from day to day with such a quantity of soot and fat, and it gathers so much dust and other filth, which they leave to clot and harden in it, for they never cleanse it, that it looks like a crust or cap of black mortar. They wore a skin over the back, fastened in front. They carried this as long as they lived, and were buried in it when they died. Their only other garment was a square piece of skin, tied around the waist by a string, and left to hang down in front. In winter, however, they sometimes used a cap. For ornaments they wore rings of iron, copper, ivory, or leather. The latter had the advantage of serving for food in bad times."

TYPES OF SAVAGERY—BUSHMAN WOMAN AND CHILDREN.

The bath has been practiced by nearly all peoples, whether savage or civilized. But among heathen tribes the act is

BARBARISM ILLUSTRATED—THE AUSTRALIAN MANNER.—Bushmen Making Poison for their Arrows.—Drawn by V. Pranishnikoff, from a description.

performed with little respect to personal purification. The sensuous change of temperature, from cold to warm or from warm to cold, with the mere pleasure of splashing like a porpoise in the surf, seems to constitute the barbarous idea of the bath. Instead of desiring to purify themselves from all animal taint, from defilement, from those offensive odors which are peculiar to tribes in low condition, such peoples seem to take pleasure in intensifying the disgusting peculiarities of the beast-life which they live. It requires many ages of development, as a rule, to change this horrid instinct and to substitute therefor the instinct of personal purity. It is in proof that as low in race development as the beginnings of barbarous song savages are accustomed to refer, in their rude rhapsodies, to the offensiveness of their bodies, and to rejoice in it as an element of merit and preëminence!

Savages bathe for pleasure rather than purification.

The Hottentots are also a good example of other debasing usages. The gathering, preparation, and taking of food may be cited as a second strongly discriminating feature of human life. One must needs reflect upon the vast difference in the method of refined eating and that of barbarism. The savage man eats very much after the manner of brutes. As to materials, he selects first of all native roots and wild fruits, such as yield themselves readily to his appetite, without cultivation or much search. The proportion of animal food in tropical countries is always considerably less than in higher latitudes, but the Hottentots are none the less great eaters of meat. As a rule, they take their flesh food raw. If they cook it at all they prefer a kind of broil in the blood of the animal, the whole being mixed with milk. No pains whatever are taken for cleanliness, either of the meat itself or of the utensils. Unless the meat is thus taken fresh in the blood they prefer to let it remain until it is half-putrid, regarding the odor and taste of decaying flesh as delicious. Such other victuals as they possess are boiled in leathern sacks, among heated stones. Sometimes earthen pots are used. The materials of the larder are kept in leathern bags, in the bladders of animals, or in baskets rudely constructed of rushes. Tobacco is in common use by the people, and is carried in pouches made of the skins of animals. The pipe is of stone or wood. The whole stock of provisions is borne from hut to hut, or from one camping place to another.

Filth in food supplements filth in personal habit.

Australia, on the whole, furnishes one of the most interesting and satisfactory fields in which to study the native aspects of human life. The barbarians inhabiting this island-continent when it became known to the European nations were as truly aboriginal in their character as any people with whom scientific observation has had to deal. Nor can it be said that the lapse of time since the coast regions of Australia fell under the dominion of civilization has materially changed the native inhabitants. They are to-day virtually as they were when they were first made known to the Western nations. And it is still possible to study their manners and customs without having to make allowance for the influence of other peoples upon them.

Australians an example of degraded savagery.

The Australian houses are perhaps the smallest and most insignificant which have ever been used as human abodes. They are scarcely large enough to contain a single person. They are shaped much like an inverted oven. The framework consists of a series of reeds, not

BARBARISM ILLUSTRATED—THE SOUTH AFRICAN MANNER.—THE SNAKE FEAST.—Drawn by Y. Pranishnikoff.

more than an inch in diameter, bent over so as to bring the two ends to the earth, in which they are driven. The covering of the hut is of palm leaves or bark, and the protection afforded to the inhabitant is very small. One side of the hovel is open, and there is little pretense of shelter. When the inhabitant enters he must sit or lie down, as the concavity overhead is not high enough to permit him to stand. No evidences of artistic taste or adornment have been discovered in connection with these primitive habitations. Nor could such houses avail anything in a country whose climate was less mild than that of Australia. Many inhabitants go without houses at all, sleeping on the ground and making no effort to secure a local habitation of their own. In some places the effort at housebuilding proceeds only so far as setting up two or three poles and leaning against them large pieces of bark, forming a sloping roof, which furnishes a simple protection from the sun and wind.

In matters of taste and cleanliness, the Australians are but little superior to the Hottentots. Their personal appearance approaches somewhat the better type of humanity, but the daily habits of life are low down among the elements of savagery. The food of the people consists of roots and nuts, certain kinds of wood fungus, or mushroom, shellfish, frogs, snakes, worms, moths, birds, birds' eggs, turtles, dogs, kangaroos, seals, and sometimes whales. All of these things, however, or nearly all, are eaten without preparation, and are taken with no sense of cleanliness or decency. It will be seen from their list of edibles that most of the articles are such as may be grabbled from the earth or the seashore. The kangaroo is a wild, fleet animal, and is taken with considerable difficulty. The dog is only eaten under stress of hunger and necessity.

Feeding as the beasts; the whale carnival.

The whale is, of course, beyond the reach of capture to these barbarians, but he is sometimes stranded from the deep or washed up dead on the shore. When this happens bonfires are kindled as a signal, and there is a holiday for the natives. It is their great providence, which they accept with as much gratitude as they are capable of knowing. The inhabitants gather from the region about, and pounce upon the carcass with the avidity of beasts. It makes no difference in what stage of putridity the flesh may be. They gorge themselves to utter repletion. They clamber about the dead body, and quarrel for the choicer parts. Notwithstanding the heat of the climate, they stuff themselves with blubber until they are distended with the fatty mass. They eat holes into the interior, and go inside to find what they can not devour. They smear themselves with the offensive oil, and remain for days together half-suffocated around the scene of their feast. Perhaps the annals of barbarism furnish no example of bestiality more gross and revolting.

It is by no means intended in this connection to give a full description of the manners and customs of the Australians or of any other barbarous nation. The whole object in this part is to illustrate the primitive life of man by a few citations from the current conditions of savagery. In another part of the work it will remain to illustrate more fully the tribal condition of the barbarous peoples lying along the outskirts of the civilized world. In further illustration of the present state of savage peoples, a few citations may be made from the life of the Veddahs, or aboriginal inhabitants

The Veddahs also exemplify the grossness of barbaric life.

of the island of Ceylon. These people are among the rudest and most primitive of any with whom modern observers have come in contact. They are small in stature, the adult male rarely reaching the height of five feet.

With the exception of a piece of skin suspended in front of the body the Veddahs go entirely naked. Their habits are as coarse and low as those of the other barbarians whom we have been describing. They live upon the wild products of the woods and by gathering shellfish from the shore. They are in possession of axes and spears and bows and arrows. These are employed almost exclusively in the chase. The peculiar feature of the Veddah life seems to be its secretiveness, or silence. Even in the hunt they are silent, attempting to slip upon and strike their game unawares. The chase consists in a noiseless approach to the animal which the hunter wishes to take. In prosecuting this kind of capture the natives adopt several devices, the most prominent being the training of bison to the purposes of the chase. The hunter hides behind the tame animal, which is taught to feed along so near to the wild one that the hunter may spring from behind and strike it down. It is a species of stalking, almost panther-like in its method and success.

The Veddahs, like the Australians and the Hottentots, have no social or civil institutions, but one or two customs are marked for their peculiarity. They do not indulge in polygamy, each man having one wife, and the tribal code being very severe in demanding fidelity of the one to the other. The rule, however, does not exclude intermarriage in the family. Brothers and sisters may marry with impunity, subject only to the restriction that the sister must be the younger of the two. Otherwise the tribe is scandalized.

Marriage customs and domestic code of the Veddahs.

The inhabitants of the Andaman islands have been cited by some travelers as the lowest existing species of men. In some respects it is doubtless true that their habits and manner of life are of the most degraded and savage order. They build their houses by planting four rude posts, two being much lower than the others. A rude, inclined roof is thus formed of bamboo, palm leaves, and bark. This is their only structure. The people appear to live exclusively upon the wild gifts of nature and by means of the primitive chase. There is a species of wild pigs that live in the jungles, which are sometimes taken and eaten by the natives. The best piece of Andaman workmanship is the rude canoe, hollowed by means of a stone ax and fire. The people use the bow and arrow, and point their missiles with such bits of glass and iron as they are able to gather from the wrecks of vessels. Travelers have admired their skill in marksmanship, which is generally accurate to the distance of fifty yards. They take fish by means of hooks and nets and harpoons. It has been noted that they are exceedingly agile in the water, and the tradition exists that the diving native is sometimes able, by the rapidity of his action, to clutch a fish with his unaided hand.

Debased condition of the Andaman islanders

In their personal habits the Andamaners are exceedingly filthy and coarse. They smear themselves with mud, and wear no clothing. Tattooing is the common practice of the tribe, but the cicatrices exhibit less skill in design than in the case of other tribes. It is the custom of the people to dig up and

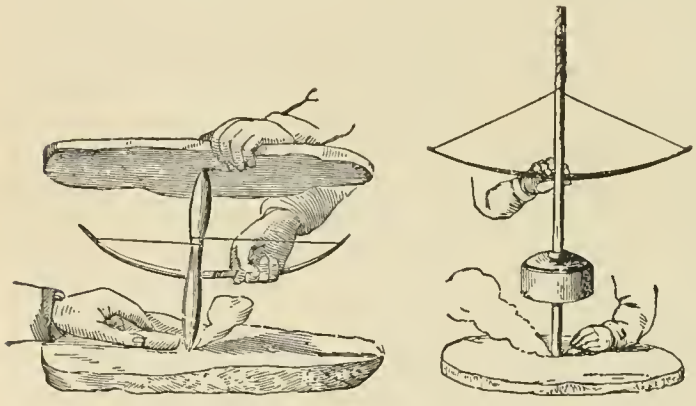
Filthiness of personal habits; uses of the dead.

BARBARISM ILLUSTRATED—THE POLYNESIAN MANNER.—Drill of Arfak Warriors.—Drawn by E. Mésplès, from a description.

distribute the bones of the dead, the skull being reserved for the widow. This she suspends by a cord around her neck and uses as a casket for her ornaments and valuables! It is believed that these savages have not succeeded in domesticating any of the animals, though it has been noted that tame fowls are seen about their huts. For the rest, their state is one of absolute savagery.

Low estate of the Tasmanians; use and preservation of fire.

The same may be said of the Tasmanians. Captain Cook has left a record to the effect that these people have neither houses nor clothes. Nor does it appear that they possessed canoes or implements for taking fish. They seem to subsist on mussels, cockles, and periwinkles. The bow and arrow were wanting at the time of Cook's visit to the island, the only weapon of the people being a long wooden spear.



Dacota fire-drill bow. Iroquois fire-pump drill.

MANNER OF PRODUCING FIRE.

Most of the barbarians to whom we have referred in the foregoing paragraphs are acquainted with the use and preservation of fire. The Australians understand the method of kindling materials by friction. It is of record that this knowledge does not extend to all the tribes. In some districts the fire goes out and must be relighted from the resources of a neighboring tribe. Most of the natives, especially those of Tasmania, are very careful to avoid the loss of their fire, and it is generally carried about from place to place. It has been noted that in Tasmania the duty of preserving the fire is assigned to the women, and they are held responsible for its loss.

Moral ideas and religious obligation among barbarians.

It is not intended in this connection to discuss what may be called the moral ideas of barbarians. Indeed, it might be difficult to speak intelligently of what has little or no existence. It is still in doubt whether the barbarous peoples referred to in the preceding pages have any true concept of religion or of its duties and ceremonial. The matter is in dispute even by observant travelers who have visited these countries and familiarized themselves with the manners and customs of the people. It has been recorded that among the Australians certain dances and ceremonies are celebrated, which would seem to imply a service of religion. But this is doubtful. It is not clear that the natives of Australia, of Tasmania, and Ceylon have any notion of a Supreme Being or of a life after death. If such notions do really exist they are in such a germinal and undeveloped condition as to be little indicative of a higher nature in the people. Certain customs and obligations do exist among them, which are observed under a sense of duty; but it may be fairly alleged that no general morality or religious bond exists.

If we leave the natives of these eastern waters and turn to those of the South Pacific, we find at least two principal races of barbarians. These are the Ne-

grito peoples and the so-called Polynesians. Among the most prominent of the former may be mentioned the Black inhabitants of the Fiji islands. In general, they are of darker complexion than the Polynesians, and are of larger stature and stronger frames. The features are more prominent and pronounced, and the hair is frizzled. There are, however, traces of Polynesian descent discoverable in the Fijians, especially in their language and in their manners and customs. In their use of consonants, and especially in the peculiarity of placing *m* or *n* before the consonants *b*, *d*, and *g*, the people appear to be of the same linguistic family with the African Nigritians.

Character of the Pelagian Blacks, or Sea Negroes.

The structures of the Fijians are, first of all, their dwellings. These, however, are much larger and more skillfully built than those which we have noted in Australia. They are made for the most part of the trunks of cocoa trees and ferns framed in a rectangular manner, somewhat like the log houses of pioneers in North America, but by no means so substantially built. Regular doorways are made in the sides, and the houses are as much as twenty or thirty feet in length, and sometimes fifteen feet in height. In another variety of house the posts are set up at intervals, like the framework of a like building designed by a modern carpenter, and the spaces between the posts are filled with wicker work of bamboo and palm branches. The roof is thatched with sugar cane and fern leaves; and, considering the mildness of the climate, the abode may be regarded as fairly convenient and comfortable. Hanging mats take the places of door shutters. In the middle of the floor some flat stones are laid down, which serve the purpose of a hearth. Here the fire is kept burning, and such rude cooking is done as is known to the people.

Buildings and furnishings of the Fijians.

The Fijians surpass most other native islanders in the building and management of boats. They build their canoes with considerable skill, and have small masts and sails. The framing of the bottom is strongly done, and the joints are calked and filled with a kind of gum prepared from the bread-fruit tree. When the islands were first known to White men stone tools were universally employed, but these have given place in part to the employment of iron. Native materials are still used in the fabrication of goods and in such rude arts as are cultivated in the islands. The natives have been observed in the work of carving and engraving, using for their tools the teeth of rats and mice. They have a way of preparing knives from the outside layer of the bamboo, which is exceedingly hard and close. After the blade of the implement has been cut into shape, it is charred and then brought to an edge so fine and strong that the instrument can be used in surgery. The Fijians understand the art of pottery, but are unacquainted with the use of the wheel. Their earthen vessels are manufactured by mere handicraft, flat stones and slips of wood being used by the women in bringing the vessels into shape. This work is so skillfully done as to resemble the product of the turning wheel, and it sometimes requires careful observation to decide whether the vessel has been actually turned or wrought by hand. The other tablewares of the Fijians are somewhat superior to those in common use among barbarians. Forks are employed in taking food, and other usages in-

Making and management of boats; tools and pottery.

dicate at least the beginnings of refinement.

Open and astounding cannibalism of the Fijians.

The cannibalism of these islanders is proverbial the world over. The eating of human flesh was until recent times the universal practice. It was done as a matter of course, and without the slightest repugnance or disgust. It was the custom, first of all, to eat the bodies of the enemy slain or taken in battle. Those recently killed were preferred, but it was not against usage to eat the bodies of those who had been dead for a considerable period. Young people, especially girls, were chosen for the feast. The preliminary murder was no more regarded than the slaughter of a fowl among civilized peoples. Any one might kill and eat his own women. It is in evidence that the Fijian looked upon his living companions with constant regard to their edibility. It was the custom of those who expected to feast upon young women and boys to speak of the lusciousness of their intended victims. It has been declared, with probable truth, that the Fijians have no word in their language to denote a human body except such as convey the notion of food. One of the common descriptive epithets of human flesh is *puaka balava*, which signifies "long pig!" it is impossible to convey an impression sufficiently horrifying of the cannibalism of these people and its attendant degradation.

BARBARISM ILLUSTRATED.—Fijian in a Banana Grove.—Drawn by Thiriat, from a photograph.

The manner of life among the Red barbarians of North America is sufficiently well known, at least to readers in our own country. The investigations of Schoolcraft and Morgan and a score of other distinguished and painstaking writers have revealed to the American people, in an imperishable record, the customs, beliefs, and habits of those peculiar tribes of the woods who preceded the White race on this continent. It is not needed, therefore, in this connection to make any extended citations from the manners and customs of our Indian races in illustration of the probable methods of antiquity. In the case of the Esquimaux, however, the matter is different. The latter are perhaps the most widely disseminated race of barbarians on the earth. They belong on the shores of the arctic oceans, stretching all the way around from Siberia to Greenland and from Greenland to Siberia. By race affinity they are allied to the North American Indians, but it is also clear from their physiognomy and other ethnic traits that they have a kinship to the Chinese and the Tartars.

Barbarism illustrated from native races of America.

It may be of interest, in passing, to note the fact that in several other instances in ethnic history we have the same contradictory evidence in regard to race descent. The Innuit language has unmistakably the same radical structure, and to some extent the same vocabulary, with that of the Red men of North America. But the stature, the form, the features of the Esquimaux, especially the physiognomy about the eyes and the structure of the skull, are clearly derivable from a common source with the Tartars. The manner of life,

BARBARISM ILLUSTRATED.—Esquimau Huts at Etah.—Drawn by A. de Neuville.

Race features of our aborigines denote Asiatic origin.

BARBARISM ILLUSTRATED—THE NORTH AMERICAN MANNER.—The Ghost Dance.—Drawn by J. Steeple Davis.

moreover, of the Esquimau nations is as much in affinity with the customs and usages of Northern Asia as with the tribal habits of the New World.[1]

Summer and winter aspect of Esquimau barbarism.

Living as they do in the most frigid regions of our planet, the Esquimau barbarians are obliged to defend themselves from the rigor of the climate. The three great elements of such defense against the hardships of nature are, of course, food, clothing, and shelter. The vicissitude of this region of the earth makes it desirable for the inhabitant to have one manner of life for the summer and another for the winter. It is in a large measure the difference between day and night—between extreme rigor of cold and a comparatively temperate climate. Two kinds of houses are therefore necessary, the one for the mild and the other for the severe aspect of nature.

The Esquimaux are, perhaps, the greatest eaters in the world, and their food is almost exclusively of fish and flesh. The reindeer, the musk ox, the walrus, the seal, land and water fowl, and salmon constitute the principal varieties of living creatures upon which they prey. But there is scarcely any kind of animal, whether marine or dry land, that they do not use for food. The fatty portions, heavy in carbonaceous materials, are greatly preferred. As to the bones of animals, the Esquimaux have the exact method of antiquity: they split them or burst them open by pounding with stones, and take the marrow as the greatest delicacy.

Omnivorous habit and gluttony of the Esquimaux.

In the manufacture of their utensils the Esquimaux have considerable ingenuity. The methods employed are nearly identical with those which we have already described as peculiar to the age of stone. Arrowheads and spearpoints are produced by spalling off flakes from blocks of flint. This is not done, however, by percussion, but by pressure. The block is set in rest and pressed with a beam of wood until it splits, flinging off a flake. Iron and bone are considerably employed for pointing arrows, spears, and harpoons. The method of making and rigging the bow is nearly identical with that of the North American Indians. The arrows are short, and the flight of the shaft is made steady by an arrangement of feathers. It has been noted, however, that the Esquimaux are by no means so expert in the use of the bow and arrow as the primitive Red men of our own country. The heads of arrows and spears are frequently barbed. The most formidable of the Esquimau weapons is the harpoon, the point being fixed to a rather heavy shaft of wood and secured by means of a line.

Skill in the manufacture of implements and utensils.

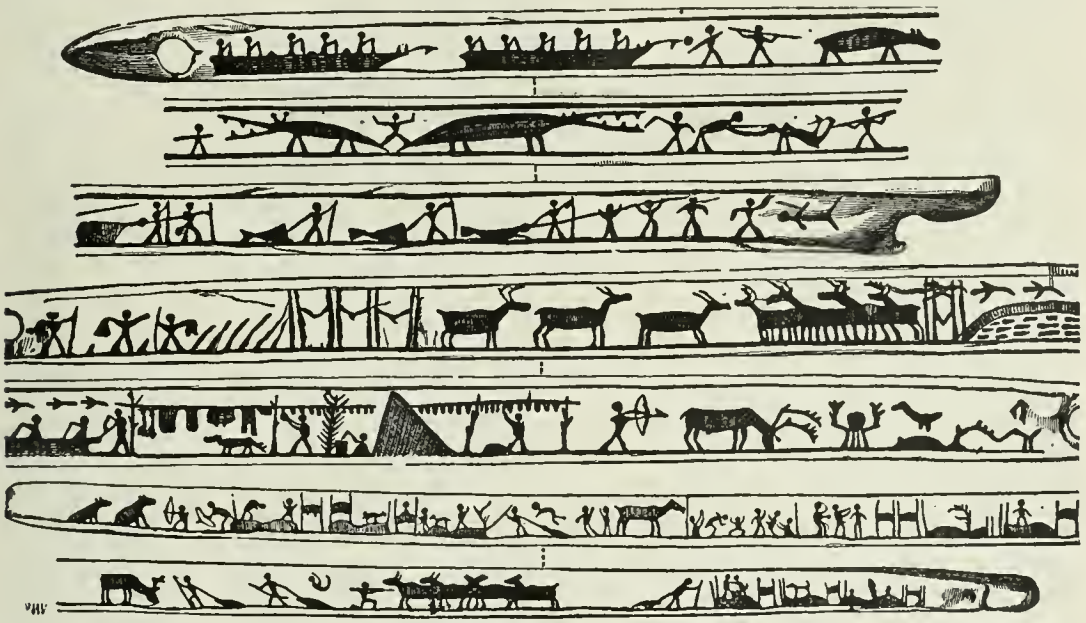
When the hunters attack a whale it is customary to affix bladders to the ends of

[1] The reader need not be especially surprised at the fact of a race descent from one source and a linguistic descent from another. Such phenomena have actually occurred in the clear light of day and under the open eye of history. The Northmen who came down in a horde, in their pirate ships, from Scandinavia, under the leadership of Rolph the Ganger, in the ninth century, and who possessed themselves of the fairest portion of France and founded in Neustria a dominion which has projected itself far and powerfully into the modern world, spoke a language as certainly Teutonic, or Norse, as they were themselves of that descent. But within a hundred years after their settlement in the South, that speech had strangely given way to another which they had absorbed from the subject peasantry of Normandy, and which became ever afterwards the vernacular of the conquering race. So that when William the Bastard came with his barons into England and planted there the Norman dynasty, he brought with him a race descent from the shores of the Baltic and a linguistic utterance derived from the softened dialects of the Southern Romance.

BARBARISM ILLUSTRATED—THE SOUTH AMERICAN MANNER.—Extermination of the Crevaux Mission.—Drawn by Riou. from a description.

the harpoon lines so that the position of the wounded animal may be seen at a distance and his course through the water impeded. The same plan is used in the less exciting and dangerous hunt of the seal. In harpooning their game the weapon is so arranged that the head, or barb, generally loosens itself from the shaft and is retained by the line which holds the bladder at the other end. In seal hunting, it is the plan of the hunter to watch carefully for the reäppearance of the harpooned animal and to strike it instantly on its emergence at the surface. The Esquimaux are not without skill in pursuing the dry land animals. They stalk the reindeer with considerable success, and are able to deceive many animals by imitating their cry or call.

Manner of harpooning the whale and the seal.



ART WORK OF BARBARIANS.

It may be noted that the Esquimaux have in their character and customs the rudiments of an ideal life. This is manifest in at least two particulars. In the first place, they have some appreciation of music. They sing a sort of monotonous songs, in both solo and chorus, accompanying themselves with drums and other rude instruments. The choral effect of this alleged music is not unpleasant to the trained ear of civilized travelers. Nor does it appear that the Esquimau songs are intended for ceremonial or for exciting the passions of the chase and war. It is amusement, or entertainment, properly so called, and therefore falls in the same category with the music of civilized peoples.

Songs and musical instruments; amusement the motive.

But a still more remarkable evidence of ideality among the Esquimaux is found in their disposition to draw and sketch. The taste for this kind of work among them amounts almost to a passion. They have a real talent for depicting the outlines of natural objects. This extends to a considerable degree of skill in the production of maps. The people have a fairly accurate knowledge of the topography of the neighborhood

Taste of the race in sketching and map-making.

BARBARISM ILLUSTRATED—THE ESQUIMAU MANNER.—Sledge and Dog Train.—Drawn by A. de Neuville, after a sketch of Dr. Hayes.

and country in which they dwell. Travelers in the arctic regions have frequently drawn upon the natives in the work of sketching the coasts and physical features of the country. In many instances the natives have produced maps for their visitors which have proved in application to be more accurate than could have been expected at the hands of barbarians.

Still more striking is their skill in the work of drawing proper. Nearly all the Esquimau ornaments and utensils are decorated with the outlines of men and birds and beasts. The tusks of walruses and the fossil ivory, which is frequently obtained, are covered with such sketching, and no little degree of skill is displayed in the work. The Esquimau's fancy takes up the scenes and incidents of daily life, the little dramas of the hut and seashore, the hazards of the chase or of fishing, and even the farcical happenings of their barbarous society, and depicts the same, with no little humor, on the surface of their drawing materials. It is probably true that no other people, ancient or modern, with whom the ethnologist and historian have acquaintance have exhibited in a corresponding stage of development so much aptitude and skill in the pictorial representation of natural objects.

Drawing on bone and ivory; subjects of art work.

Otherwise the Esquimaux have little intellectual force and no attainments. It is surprising to the traveler to observe their labored efforts in attempting to grasp general ideas. They have no mathematical ability whatever. Their minds in respect to number and permutation are as weak as those of children. They are rarely able to count as much as ten, and beyond this they are unable to go. They have large families, which in the northern regions are a blessing rather than a discomfort. It has been observed that the man of the hut can rarely tell the number of his children. He will attempt to enumerate them on his fingers, will fail, and the matter will result in an animated dispute between himself and his wife! The perceptions properly so called are in a better state of development than the judgment. Those faculties which have been brought into exercise by the conditions of the Esquimau environment have been quickened into tolerable activity. But the rest of the mind lies dormant, as in a state of absolute savagery.

Weakness of the Esquimaux in abstraction; inability to count.

The social system of these people is miserable in the last degree. They practice polygamy. The chief men particularly encumber themselves with multiple wives, and the usage attracts no comment. Polyandry is also in vogue, but is not so common as polygamy. A woman of unusual attractiveness will frequently have two or three husbands, but the common lot are content with one. The sanctity of the relation of the man and the woman is not regarded. The custom which has been noted among many savage nations of loaning to a visiting stranger the wife of the man who is visited prevails among the Esquimaux. The act is regarded as a social compliment, and any refusal to accept the same on the part of the visitor would be a gross violation of etiquette.

Degradations attendant upon polygamy and polyandry.

As to moral qualities, the Esquimaux have very little appreciation of duty, obligation, or dependence on a higher power. Their promise or pledge, however solemnly made, is generally worthless. It does not appear that they willfully deceive or purposely break their

Weakness of moral nature; a rude humanity.

word. But the changing conditions of to-morrow making it of advantage to violate a pledge of to-day furnish an easy reason to the barbarian for doing so.

Of religious duty and ceremony they know but little or nothing. In their relations with one another, however, they are generally kind, humane, accommodating. The neighborly feeling prevails in the Esquimau settlements. There is much of common interest among them. The people support each other in their rude enterprises, and

Drawing of an ibex.

Group of figures.

ART WORK OF THE ESQUIMAUX—DRAWING ON BONE AND IVORY.

generosity is by no means unknown. The poorer members of the tribe are supplied in times of want. The hunter divides the results of his successful pursuit with his less successful companion. Two or three fishermen who have had the good fortune to take a walrus are by no means niggardly in distributing to others a portion of their fortune.

In one striking particular the Esquimaux rise above their contemporaries of the American forest. They are never willfully and maliciously cruel. There is, perhaps, no authentic instance on record of vindictive and preconcerted cruelty toward their fellows. The absence of this disposition among them, however, is rather in the nature of apathy than of a positive virtue. They are simply indifferent, and are incapable of cruelty or revenge because of their passionless character. They are cold in life and manners, and, though little disposed to do actual harm or to inflict pain upon their fellows, they are equally indisposed to do them positive good. Such, in brief, is the manner of life, the habit, the taste, the intellectual capacity, and general disposition of these widely disseminated barbarians of the North.

Absence of cruelty traceable to ethnic indifference.

The foregoing account of the general condition of several barbarian races is little more than a sketch of superficial aspects. There is no pretense in this connection of making a complete picture of savage life as it exists at present in various quarters of the world. That work is reserved for another part of this treatise on the Great Races. What is here presented is merely illustrative of savage manners and customs as they now prevail, and the meaning of the illustration is simply to throw light, by reflection, upon the condition of mankind in prehistoric ages. In every epoch since the appearance of human beings on the globe men have been men. Their essential characters, dispositions, and tendencies have always been the same, or at least in close analogy. The human animal has always had his own habits, peculiarities, and possibilities of development. The present state of the barbarous races, therefore, is of much value to the historian and ethnologist in

Present dissertation on barbarism no more than a sketch.

determining the primitive condition of mankind, and it is for this purpose that the foregoing imperfect sketches of several savage peoples have been presented. The current savagery of the world is exponential of that prehistoric barbarism which prevailed before the beginnings of authentic history; and, although much allowance must be made for the varying conditions of environment and instinct in the prehistoric ages and at the present time, it can not be doubted that the current aspect of barbarous life is in most respects a faithful picture of that which prevailed before the Vedas were chanted in the valley of the Indus, before Abraham took his journey from Ur of the Chaldees, before the sea-beaten Æneas and his Trojan companions had found a footing on the western coasts of Latium.

Besides the condition of absolute savagery described in the preceding paragraphs, certain secondary stages of barbarism may well be noticed. We may not say with certainty that the semibarbarity of the world is the resultant of such antecedent savagery as we have described; but no doubt such is the fact. Neither may we affirm certainly that the semibarbarous peoples are to be the progenitors of highly civilized races. It is probable that the analogy of the tree should here again be applied to the human race as a whole. Branches put out and are developed to a certain stage. Beyond this they do not expand. Presently they decay and die. Then they fall away from the vital trunk which supports the more vigorous and expansive branches above.

Place of semibarbarians in the ascending scale of races.

It will not do to say that all branches of a vital organism are equally potent in development. It is only the more central and stronger that shoot up and spread and flourish. This is probably true of the evolution of mankind considered as one organic, living thing. Possibly the present residual savagery of the world will never reach much beyond its present stage of evolution. This may be true also of the semibarbarous peoples. For the present it suffices that such peoples exist and occupy a considerable part of the earth's surface. Their manners, customs, and modes of existence differ much from those of the savages whom we have described above. They also differ much from the usages of the civilized races—most of all from the refined and cultivated peoples of Europe and America.

Philosophy of the semibarbaric estate of man.

Such types as we here contemplate may be found widely distributed throughout Northern Asia. They are of vast territorial expansion and of a comparatively low manner of life. As an example of the whole class the Tunguses of North-Central Asia may be cited. Their customs are above the horizon of savagery, but greatly below the line of civilization. What is said of their customs may be repeated of their intellectual and moral qualities. We note among them a considerable development of the mental faculties and a measure of moral obligation and duty. But these terms must be defined, not according to the standards with which we are familiar, but by a criterion fixed for the particular thing to be defined.

The Tunguses an example of North Asiatic barbarity.

The Tungusic barbarians live the wild life of hunters and fishermen. They tame the reindeer, using that animal for both food and draught. In like manner they train their dogs to draw their sledges. They live a half-sedentary life, having a rude society and the beginnings of usages that in higher

progress would be defined as civil. The domestic estate is in a corresponding stage of development. The religious life has been vaguely determined by a native faith which is called Shamanism, and by the vague outreaching influences of Lamaism from the side of the Mongolian countries, and the touch of Greek and others in the other; that is, one aspect of the Moorish life seems to approximate the conditions present in Europe and the Americas, while another aspect is distinctly barbarous.

In their commercial transactions, and indeed in all of those parts of their public life in which they are brought into

SEMIBARBARISM ILLUSTRATED—THE NORTH ASIATIC MANNER.—TUNGUSIC SORCERER.
Drawn by Victor Adam, after a sketch of the Count de Rechberg.

Catholicism out of Siberia and the West.

We may note also a grade of semibarbarity peculiar to North Africa and to some portions of Eastern and Southeastern Asia.

Semibarbarism of the Moors and Berbers.

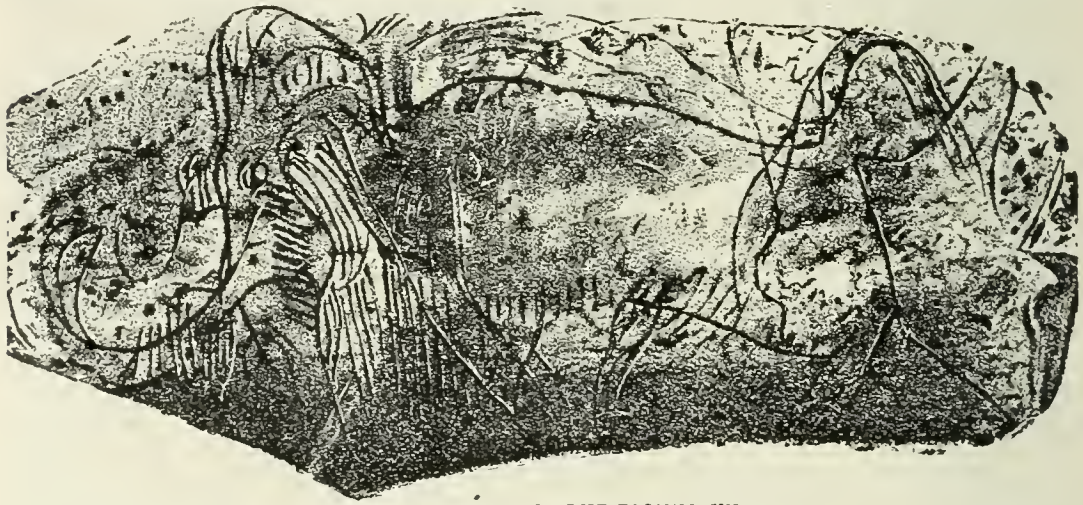
Perhaps the semibarbarous life of the Moors is the highest estate of mankind below the level of civilization. Some of the usages of the Moors and Berbers look in one direction contact with foreign nations, the Moors have the manners peculiar to the ruder forms of civilization. But in their race customs—those which they have derived from the past—they are distinctly barbaric. Their personal manners among themselves have the sense and flavor of a remote and barbaric past. Their wild dances and crude religious ceremonies ally the race with the barbarians, leaving only a small reason for

SEMIBARBARISM ILLUSTRATED—NORTH AFRICAN MANNER.—Sword Dance of the Moors.—After the painting by P. Ivanovitch, Paris, 1890.

classifying them with the civilized peoples of the world.

Several important inferences are now to be drawn from the subject-matter of the present chapter. It remains to summarize the results and to state their meaning. The reader will, doubtless, already have deduced several conclusions from his study of the preceding chapters; but it will be of additional interest to state in a few paragraphs the leading truths which follow as a logical conclusion from premises furnished by the study and comparison of prehistoric and modern barbarism.

repulsive features. What the cave men of Western Europe and the shell-mound people of the shores of the Baltic were in the post-pliocene era—when the mammoth was still a denizen of Western Europe and America, when the hairy rhinoceros and the reindeer were in the valleys of the Seine and the Loire, when the cave bear and the cave hyena and the *Bos primigenius* still maintained their existence from the northern ocean to the Pyrenees—that the native Australians, the Veddahs of Ceylon, the savages of the Andaman islands, and the Fuegians of South America are to the pres-



PICTORIAL WORK OF THE ESQUIMAUX.

1. In the first place, it will be noted that the prehistoric age and the current epoch of human history alike *furnish examples of the lowest stages of human development*. This is to say that at the two extremes of human history, the one lying below the daydawn of authentic annals and the other reaching to the very feet of the present, tribes of men are found *in similar stages* of degradation and savagery. This signifies that the whole of human history has not been sufficient to extinguish barbarism from the earth, or even to obliterate its most ent day. Some variations and departures of tribal character doubtless exist between the prehistoric barbarians and their fellows of the modern world. No doubt there are conditions prevalent, forces operative in the processes of our planet life which have effected changes and diversities of character between the ancient and the modern savages; but the fact remains of their characteristic and essential identity. In food and clothing, in weapons and utensils, in hut building and the rude beginnings of artisanship, in coarseness of manners and brutality of life, the two extremes of the ethnic

All ages furnish examples of lowest human condition.

history of man may be brought together, and the difference might be hard to seek.

2. The life of man in the prehistoric ages and in the modern barbarian world *presents similar extremes of development*. This is to say that in the primitive world great variety is discovered in the life of tribes and peoples, and in the degree of development. In some, the evolutionary forces had already worked a considerable result at our earliest acquaintance with a given people, while in others the grossness of savagery was unabated. If we scrutinize the old house-folk of Arya or study the characteristics of some of the better peoples of Asia Minor and the West, such as the Pelasgians of Greece, or the Etruscans of Italy, we shall find them to have been vigorous and growing races, great builders of stone, makers of towns and treasure-houses and fortifications and aqueducts. But if we glance at other aspects of prehistoric humanity we find no such promising symptoms of expansion and possibility. In general, the aboriginal inhabitants of Western Europe were as low in development as may well be conceived. The cave men and the coast people were in the extreme of savagery, and it is difficult to point to a single evidence among the relics and memorials which they have left to archæology and history of even a tendency to reach a higher stage of life.

Like extremes of development present in ancient and modern times.

This same contrariety between the higher and lower aspects of human existence in the prehistoric world finds an exact analogy among modern barbarians. Here, also, we have mixed evidences of the progressive and nonprogressive disposition. Many of the existing barbarous races are as absolute in their savagery as were any of the prehistoric tribes, while others give proof of a forward movement and of actual attainment, which may well elicit hopefulness and even challenge admiration. The general principle is that the same diversity which we find evidenced among the races of the primitive world

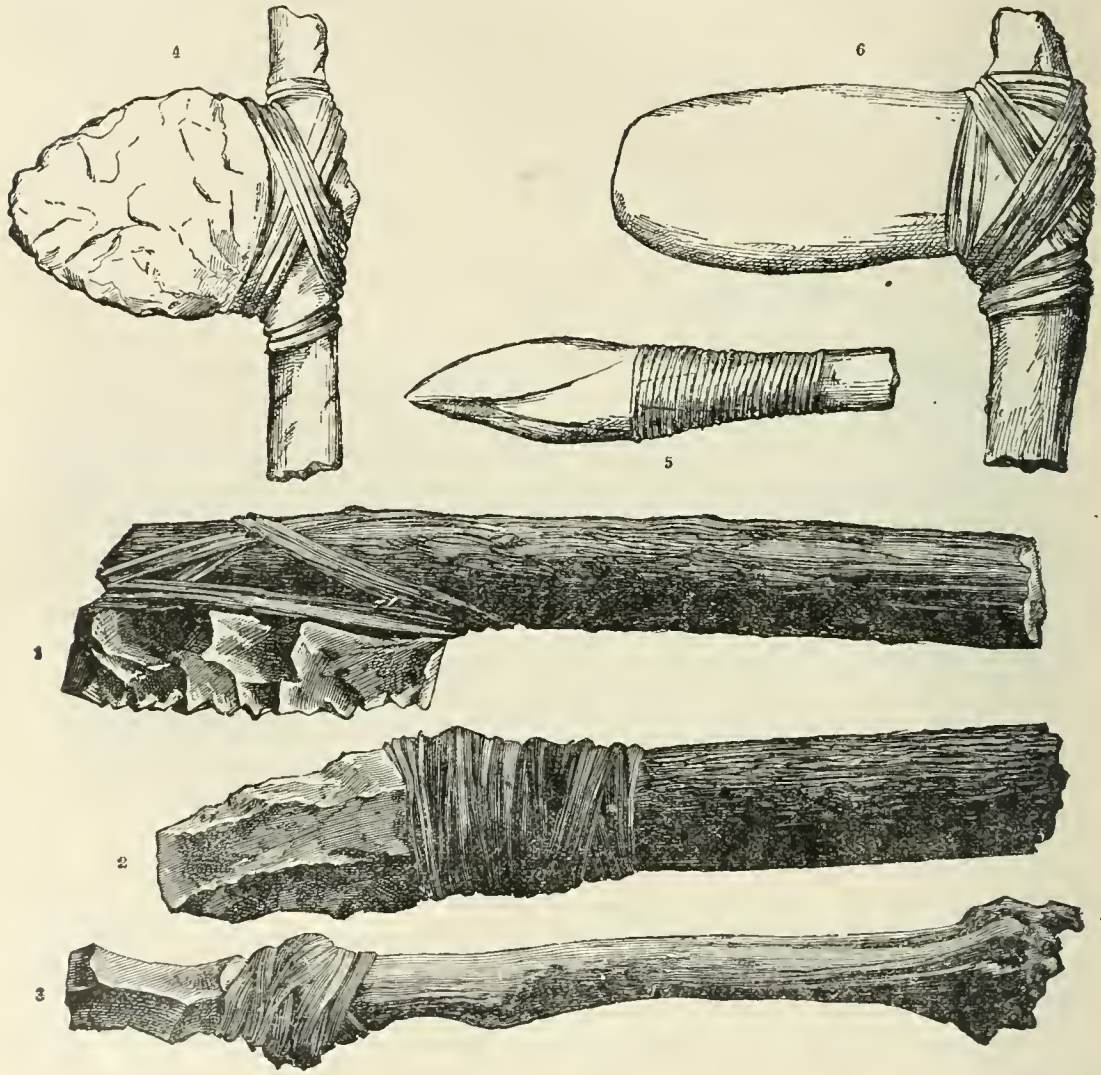
NONPROGRESSIVE STATE OF BARBARISM.—Chippewas of Sault Sainte Marie

Existing barbarism both progressive and nonprogressive.

exist among the barbarous peoples of the present time; from which it would appear that beyond the pale and influence of the civilized nations a state of human society still exists which is little dissimilar to that which the ethnologist discovers on the remotest horizon of his inquiry.

3. The study of the existing forms of barbarism throws very little light on fundamental questions relative to *the origin of savagery and the primitive distribution of mankind.* In contemplating the barbarous races now inhabiting the outskirts of the world, we discover little or nothing to inform the judgment as to *how* savagery begins or ends, or as to the ethnic *source* from which such peoples have descended. Their traditions, as already remarked are valueless, and their monuments and arts serve only to illustrate the passing phases of their social condition. It is possible for the

The barbaric life does not reveal its own origin or spread.

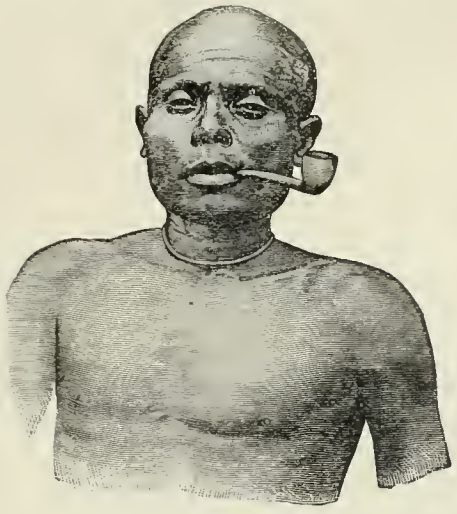


PROGRESSIVE ELEMENT IN BARBARISM—ILLUSTRATED IN WEAPONS OF NEW ZEALANDERS.
1, saw; 2, chisel; 3, knife; 4, ax of chipped flint; 5, spear of ground stone; 6, ax of polished stone.

historian to see in the actions of existing barbarians those unconscious movements of man which, in some instances at least, precede the birth and early struggles of civilization. Savage tribes in such a state of development—if, indeed, they are developing at all—are in close analogy with the unconscious period in human life. There is a sense in which the species is always epitomized and expressed in the individual. What the child does without consciousness of its own actions or tendencies, that the species does in an analogous stage of development. But the evidence of the child with respect to its own past, or even with respect to its own purposes, would be little regarded by any candid inquirer. It is a period in individual or tribal life characterized by dreams and vagaries of the fancy; and it must not be forgotten that the fancy is frequently distorted by abnormal conditions and even by disease and delirium. On the whole, the impartial student of the primitive condition of mankind is able to discover as much evidence out of the memorials of the prehistoric ages relative to the origin and essential character of barbarism and the beginnings of tribal life in different quarters of the world, as he is able to discover from the closest scrutiny of the actions and manner of life of the existing barbarous peoples.

4. The chief difference between the aspect of modern barbarism and that of the primitive world is in *its geographical distribution.* The disposition of modern savagery is very different as it respects the habitable surface of the globe from that of the ancient world. In the earliest epochs accessible to our information savagery was distributed into all parts and places. It had possession of the choicest regions of the globe. There was a time when it was the central fact in Asia, in Europe, and in the two Americas. Until the present century it was still the central fact in Australia, but the growth and spread of civilization has displaced its barbaric competitor. At the first the savage state gave away in the river valleys of the East and in those choice peninsulas which drop down from the northern continents into the southern waters. In a later stage barbarism receded from the regions north of the great mountain chains. The central portions of the continents were reclaimed, and there was a recession, a retreat, of savagery toward the borders of the world.

Ancient and current barbarism differently distributed.



UNPROGRESSIVE CONDITION—MINCOPA MAN, FROM THE ANDAMAN ISLANDS.

The general result has been the extirpation of the barbarous condition in all the central and better parts of the habitable globe. It is in these best regions of the world that the great powers are planted. Here they flourish, and in proportion as they are vigorous and possess the elements of perpetuity, they extend themselves, by varying conquests, toward the horizon. Savagery

Civilization has crowded savagery out of the better parts of the world.

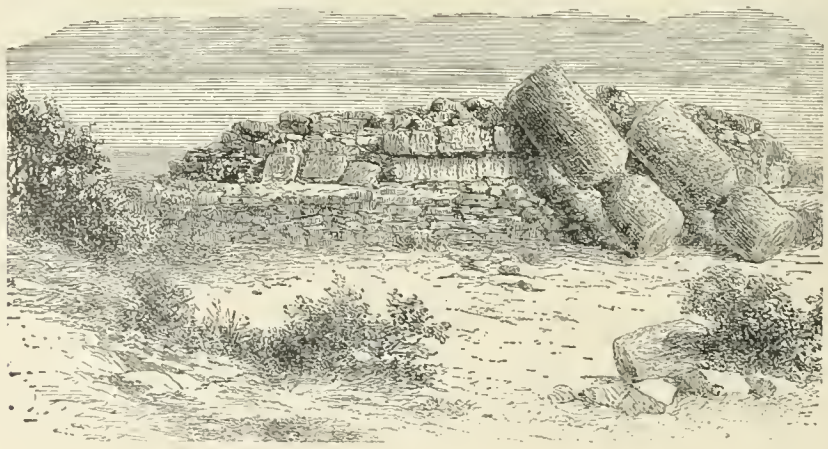
has fallen back before this movement and is now compelled to occupy the further coasts of the planet. In the far regions of the north it is still able to maintain itself, at least for a season. In parts of South America and in nearly the whole of Africa it still prevails, flourishing as it were under the ægis of a climate which seems to forbid the development of a higher civilization. As for the rest, barbarism plants itself in what will perhaps prove its last stronghold, the remote islands of the great oceans. It is easy to discover how vastly the position and relative importance of civilization and the barbaric life have been changed in their geographical place, with a constant advantage in favor of the civilized condition.

5. The principal lesson deducible from the present aspect of savagery is the emphasis which it places on *the difference between the progressive and the nonprogressive parts of the human species*. We have seen above that many forms of existing savagery are as low and unpromising as any which prevailed in the prehistoric era. The flint implement of to-day is in no wise superior to that which the cave dweller used in his battle with the extinct mammalia of Western Europe. The manners and customs of the Andamaners and the Veddahs, and the method of life of the Digger Indians in Western America are in everywise as gross and degrading as any which are suggested by the memorials and relics of the primitive world.

Difference between progressive and nonprogressive parts of human life.

It appears conclusive that a considerable part of the human race is at the present time in a condition as degraded and unprogressive as any which is suggested by our knowledge of the prehistoric races of the Old World. On the other hand, we have the fact of evolutionary progress splendidly illustrated in the history, tendencies, and prospects of the civilized races. It is apart from the present purpose to speak of the industry, the enterprise, the letters, the art, the triumph over the obdurate forces of the natural world, which have been practiced and achieved by the great peoples now holding dominion in the earth. It is sufficient to note and to emphasize the contrast which is afforded by the degraded and the elevated aspects of human life, and this contrast is brought most vividly to the mind of the inquirer as he considers the aspect of barbarism set darkly against the blazing disk of civilization.

Lowest savagery still present in several parts of the globe.



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